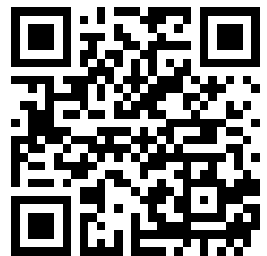

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Catalogue No. 2

Seventh Edition

June 1920

No. 19651

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SUPPLIES SMALL TOOLS AND MACHINERY OF ALL KINDS

FOR

Mines and Mills, Machine Shops, Garages, Planing Mills, Saw Mills,
Box Factories, Power Plants, Contractors, Shipbuilders,
Foundries and all Manufacturing Plants



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LOS ANGELES

QUALITY

INTRODUCTION

In compiling this catalogue we have endeavored to place before our customers a clear reference book of **QUALITY LINES** of **SUPPLIES**, **SMALL TOOLS** and **MACHINERY**. In the rear of the catalogue we have placed some very useful tables for the convenience of our friends that do not have this information in any other form and hope that you will find them useful.

Due to the very unsettled condition of the metal market it has been impossible to place prices against many of the items that would give a clear idea of the actual cost of them and for this reason we have eliminated the prices. We shall, however, at all times extend to you our very best prices. Where we have named list prices same are, in most cases, subject to a discount.

SMALL TOOLS AND SUPPLIES

Our stock of Small Tools and Supplies has been selected from lines that have a world-wide reputation for service and quality and we order in quantities that will enable us to name fair prices to our customers. We are prepared to give **SERVICE** on any orders placed with us no matter how small, a complete equipment, a single tool or an order for a few cap screws or a pound of steel.

GENERAL MACHINERY

In the Machinery Section in the rear of our catalogue we have endeavored to illustrate and describe in a brief way only our most important lines of General Machinery for the Machine Shop, Garage, Mine and Mills Contractor, Power Plant, Saw Mill, Planing Mill, Box Factory and other manufacturing plants. We endeavor to carry representative stocks of these lines at San Francisco and Los Angeles so that prompt deliveries can be made. We have only briefly illustrated and described these lines but shall be pleased to send you catalogue, completely illustrating and describing any machines in which you may be interested.

ORDERS AND INQUIRIES

All orders and inquiries will receive prompt and careful attention. In order to avoid mistakes and delays please be as specific as possible when placing orders or making inquiries. Give catalog numbers wherever mentioned in catalogue.

If interested in Small Tools, Supplies or Machinery that do not appear in our catalogue please let us know the equipment in which you are interested and we will be pleased to obtain complete information for you.

Please state on all orders whether shipment is desired by freight, (rail or water, and if shipment is to be made by water advise whether or not you wish same covered by Marine Insurance,) express or Parcel Post and if there is any preference in the routing please state specifically how the shipment is to be routed.

We exercise great care in packing and obtain receipts from forwarding companies "In good condition." If goods are received in a damaged condition make sure that the damage is called to the attention of the carrier and that a notation of the damage is made on the receipt given the carrier for the shipment. While not ourselves responsible we are desirous of having the claims of our customers adjusted.

CLAIMS AND ERRORS

Stenographic errors are subject to correction. We shall be very pleased to correct any errors that have been made and shall appreciate prompt reports of errors of any kind. Claims for errors or shortages must be made within five days after receipt of goods but no merchandise is to be returned without our consent.

TERMS

All quotations are subject to change without notice.

New customers not satisfactorily rated by the Commercial Agencies, in order to avoid delay, should send references with first order, or advise us that it will be satisfactory to ship C. O. D. References of houses with whom you are doing business are preferred.

Very truly yours,

HARRON, RICKARD & McCONE

TO OUR FOREIGN TRADE

We are particularly well adapted to take care of foreign shipments. We have had forty-five years' experience with this trade and are now shipping to all ports that can be reached from the Pacific Coast. We are very careful regarding the packing of these shipments and the handling of the shipping documents so as to assure safe arrival at destination and minimum transportation charges.

We are large shippers and receivers of freight and are thoroughly acquainted with all shipping facilities, rules and regulations. Our warehouse is located within one or two blocks or Squares of the Railroads and within two blocks or squares of the San Francisco waterfront.

We have on file in our office all standard codes and are prepared to receive your inquiries and orders in any code or language you may choose to use.

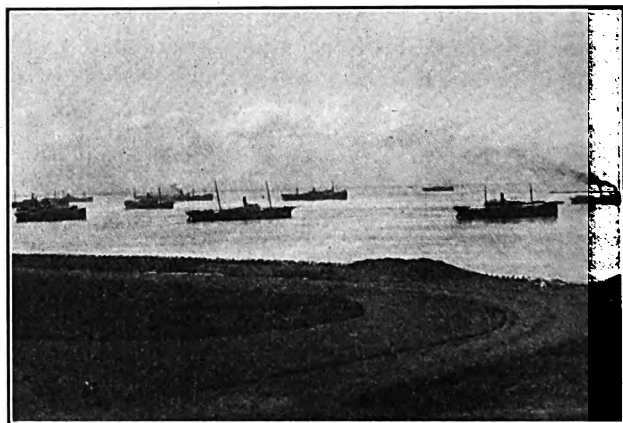
Wij zijn sedert 1875 gevestigd als Fabrikanten en Handelaren in alle soorten van Machienen en aanbehoorigheden en hebben steeds voorradig artikelen welke eene wereldberoemdheid voor kwaliteit en duurzaamheid hebben verworven.

Onze voorraad van Machienen en aanbehoorigheden is de grootste en best geassorteerde aan deze kust, en wij zijn bereid tot DADELIJKE VERSCHEPING van nagenoeg eenige normale uitrusting.

Wij hebben menige jaren ervaring in de verscheping voor verre landen, en wordt aan de verpakking onzer goederen de grootste aandacht gewijd, ten einde behouden aankomst en een minimum van transport kosten te verzekeren.

Indien U koopers zijn voor Machienen, werktuigen van eenige beschrijving, zouden wij gaarne vernemen de aard der inrichting waarin U beland hebben, en wij zullen U volgaarne de meest volledige inlichtingen verstrekken. Prijslijsten van de artikelen welke wij in voorraad hebben zoowel als van elk anderen die U mogen interesseren zijn steeds ter uwer volle beschikking. Wij quoteeren U slechts de allerlaagste prijzen, en stellen wij ons bereid om van U eenige aanvragen of orders te ontvangen, met de verzekering dat deze, zonder uitstel, onze meest zorgvuldige aandacht zal gegeven worden.

Alle standaard telegrafische codas zijn ten onze kantoore in gebruik en wij zijn bereid uwe aanvragen en orders te ontvangen in eenige coda of eenige taal welke U mogen verkiezen.



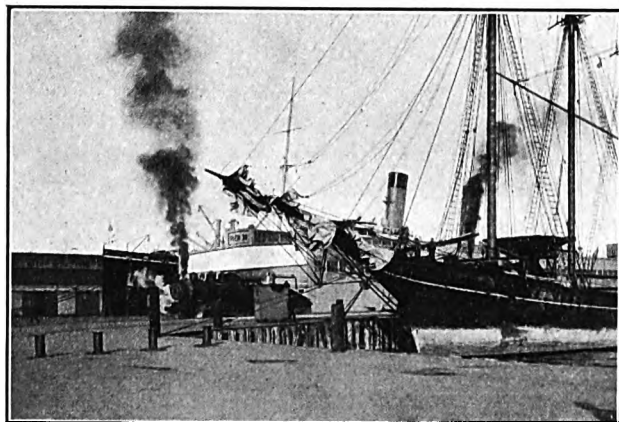
Estamos dedicados al negocio de maquinaria y accesorios desde el año de 1875, teniendo en existencia un completo surtido de las mejores marcas de reputación universal tanto por su clase como por su duración.

Nuestro surtido de maquinaria, herramientas pequeñas y accesorios, puede considerarse como el más completo en la Costa del Pacifico, y estamos en condiciones de efectuar ENTREGA INMEDIATA de casi cualquier equipo o instalación que pueda necesitarse.

Tenemos largos años de experiencia en los embarques de exportación, teniendo siempre el mayor cuidado para el empaque con el objeto de asegurar que lleguen en perfecto buen estado a su destino, y que los gastos de transporte sean los más reducidos.

Al necesitar maquinaria o accesorios de cualquier clase, les estimaremos avisarnos el equipo o instalación que les interese, y con el mayor gusto suministraremos detalles completos. Remitiremos a solicitud tanto los catálogos de n/ casa así como descripción de otra maquinaria que les interese. Estamos en condiciones de cotizarles los precios más reducidos y les estimaremos cualquier pedido o solicitud que nos confiën, asegurandoles que daremos nuestra mejor y pronta atención.

Tenemos en nuestras oficinas ejemplares de todas las claves cablegráficas, y estamos en condiciones de recibir sus solicitudes por cablegrama o carta en cualquier clave o idioma que Uds. deseen."



TO OUR FOREIGN TRADE

Фирма наша существуетъ съ 1875 года и наши машины и принадлежности къ нимъ имѣютъ всемірную извѣстность своимъ качествомъ и прочности.

Нашъ постоянный запасъ машинъ, запасныхъ частей къ нимъ и мелкихъ инструментовъ является самымъ крупнымъ и наилучше assortированнымъ на Тихо-Океанскомъ побережья и даетъ намъ возможность немедленно грузить и отправлять любыя заказы въ области нашего производства. Долгій опытъ въ заграничномъ экспортѣ научилъ насъ обращать тщательное вниманіе на упаковку этихъ отправокъ и поэтому товаръ прибываетъ въ цѣлости на мѣсто назначенія при минимальныхъ расходахъ.

Если Вы интересуетесь какими либо машинами и принадлежностями къ нимъ, то просимъ сообщить намъ и мы съ удовольствіемъ пришлемъ Вамъ подробныя свѣдѣнія. Каталоги нашихъ машинъ и какихъ либо Васъ интересующихъ другихъ машинъ мы вышлемъ Вамъ при первомъ требованіи. Мы въ состояніи назначить Вамъ самыя низкія цѣны и будемъ рады получать ваши заказы или запросы которые будутъ выполнены съ наибольшей аккуратностью и тщательностью.

Мы пользуемся въ своей конторѣ всѣми телеграфными кодами и можемъ получать Ваши запросы и заказы на любомъ языкѣ и кодѣ.



Nous sommes établis pour la construction et le commerce des machines et accessoires depuis 1875 et nous avons toujours disponibles des articles qui ont acquis une réputation mondiale quant à leur qualité et leur durée de service.

Notre stock de machines, outils et accessoires est le plus grand et le mieux assorti sur la Côte du Pacifique, et nous sommes outillés de manière à pouvoir **EXPEDIER SANS RETARD** à peu près toute installation normale qui pourrait être requise.

Nous avons une expérience datant de nombreuses années en tout ce qui concerne l'expédition pour des contrées lointaines, et nous prenons le plus grand soin de l'emballage, de manière à être assurés d'une bonne arrivée à destination et de profiter d'un minimum de frais de transport.

Si vous êtes acheteurs de marchandises et accessoires de n'importe quel genre, nous vous serions reconnaissants de nous faire connaître le genre d'installation qui pourrait vous intéresser, et c'est avec le plus grand plaisir que nous vous enverrons des informations détaillées. Des Catalogues concernant les articles que nous traitons ainsi que d'autres articles dans lesquels vous auriez intérêt sont toujours à votre disposition sur demande. Nous sommes en mesure de vous coter les prix les plus réduits et nous pouvons vous assurer que toutes les commandes et toutes vos demandes de renseignements seront dûment appréciées et recevront toute notre attention.

Nous avons en usage dans nos bureaux tous les codes télégraphiques courants et pouvons, en conséquence, traiter avec votre maison dans n'importe quel code ou n'importe quelle langue à votre choix.

Veuillez agréer, Messieurs, l'assurance de notre considération très distinguée.



PARCEL POST—WEIGHTS AND RATES

FOR ZONE LOCATION, SEE PAGES IX AND X

Weight limit and rates as follows:

Up to 4 ounces. One cent per ounce or fraction, for any distance. Over 4 ounces take pound rate.

Weight in pounds	ZONES								
	City Rate	First up to 50 miles Rate	Second 50 to 150 miles Rate	Third 150 to 300 miles Rate	Fourth 300 to 600 miles Rate	Fifth 600 to 1000 miles Rate	Sixth 1000 to 1400 miles Rate	Seventh 1400 to 1800 miles Rate	Eighth all over 1800 miles Rate
1	\$0.05	\$0.05	\$0.05	\$0.06	\$0.07	\$0.08	\$0.09	\$0.11	\$0.12
2	.06	.06	.06	.08	.11	.14	.17	.21	.24
3	.06	.07	.07	.10	.15	.20	.25	.31	.36
4	.07	.08	.08	.12	.19	.26	.33	.41	.48
5	.07	.09	.09	.14	.23	.32	.41	.51	.60
6	.08	.10	.10	.16	.27	.38	.49	.61	.72
7	.08	.11	.11	.18	.31	.44	.57	.71	.84
8	.09	.12	.12	.20	.35	.50	.65	.81	.96
9	.09	.13	.13	.22	.39	.56	.73	.91	1.08
10	.10	.14	.14	.24	.43	.62	.81	1.01	1.20
11	.10	.15	.15	.26	.47	.68	.89	1.11	1.32
12	.11	.16	.16	.28	.51	.74	.97	1.21	1.44
13	.11	.17	.17	.30	.55	.80	1.05	1.31	1.56
14	.12	.18	.18	.32	.59	.86	1.13	1.41	1.68
15	.12	.19	.19	.34	.63	.92	1.21	1.51	1.80
16	.13	.20	.20	.36	.67	.98	1.29	1.61	1.92
17	.13	.21	.21	.38	.71	1.04	1.37	1.71	2.04
18	.14	.22	.22	.40	.75	1.10	1.45	1.81	2.16
19	.14	.23	.23	.42	.79	1.16	1.53	1.91	2.28
20	.15	.24	.24	.44	.83	1.22	1.61	2.01	2.40
21	.15	.25	.25	.46	.87	1.28	1.69	2.11	2.52
22	.16	.26	.26	.48	.91	1.34	1.77	2.21	2.64
23	.16	.27	.27	.50	.95	1.40	1.85	2.31	2.76
24	.17	.28	.28	.52	.99	1.46	1.93	2.41	2.88
25	.17	.29	.29	.54	1.03	1.52	2.01	2.51	3.00
26	.18	.30	.30	.56	1.07	1.58	2.09	2.61	3.12
27	.18	.31	.31	.58	1.11	1.64	2.17	2.71	3.24
28	.19	.32	.32	.60	1.15	1.70	2.25	2.81	3.36
29	.19	.33	.33	.62	1.19	1.76	2.33	2.91	3.48
30	.20	.34	.34	.64	1.23	1.82	2.41	3.01	3.60
31	.20	.35	.35	.66	1.27	1.88	2.49	3.11	3.72
32	.21	.36	.36	.68	1.31	1.94	2.57	3.21	3.84
33	.21	.37	.37	.70	1.35	2.00	2.65	3.31	3.96
34	.22	.38	.38	.72	1.39	2.06	2.73	3.41	4.08
35	.22	.39	.39	.74	1.43	2.12	2.81	3.51	4.20
36	.23	.40	.40	.76	1.47	2.18	2.89	3.61	4.32
37	.23	.41	.41	.78	1.51	2.24	2.97	3.71	4.44
38	.24	.42	.42	.80	1.55	2.30	3.05	3.81	4.56
39	.24	.43	.43	.82	1.59	2.36	3.13	3.91	4.68
40	.25	.44	.44	.84	1.63	2.42	3.21	4.01	4.80
41	.25	.45	.45	.86	1.67	2.48	3.29	4.11	4.92
42	.26	.46	.46	.88	1.71	2.54	3.37	4.21	5.04
43	.26	.47	.47	.90	1.75	2.60	3.45	4.31	5.16
44	.27	.48	.48	.92	1.79	2.66	3.53	4.41	5.28
45	.27	.49	.49	.94	1.83	2.72	3.61	4.51	5.40
46	.28	.50	.50	.96	1.87	2.78	3.69	4.61	5.52
47	.28	.51	.51	.98	1.91	2.84	3.77	4.71	5.64
48	.29	.52	.52	1.00	1.95	2.90	3.85	4.81	5.76
49	.29	.53	.53	1.02	1.99	2.96	3.93	4.91	5.88
50	.30	.54	.54	1.04	2.03	3.02	4.01	5.01	6.00
51	.30	.55	.55	1.06					
52	.31	.56	.56	1.08					
53	.31	.57	.57	1.10					
54	.32	.58	.58	1.12					
55	.32	.59	.59	1.14					
56	.33	.60	.60	1.16					
57	.33	.61	.61	1.18					
58	.34	.62	.62	1.20					
59	.35	.63	.63	1.22					
60	.35	.64	.64	1.24					
61	.36	.65	.65	1.26					
62	.36	.66	.66	1.28					
63	.36	.67	.67	1.30					
64	.37	.68	.68	1.32					
65	.37	.69	.69	1.34					
66	.38	.70	.70	1.36					
67	.38	.71	.71	1.38					
68	.39	.72	.72	1.40					
69	.39	.73	.73	1.42					
70	.40	.74	.74	1.44					

INSURANCE

3c Up to.....\$ 5.00 10c Up to.....\$ 50.00
5c Up to.....25.00 25c Up to.....100.00

The limit of weight on Parcel Post packages intended for local, first, second and third zone delivery is seventy (70) pounds.

For other zones the weight limit is fifty (50) pounds.

The measurement limit is 84 inches in length and girth combined.

The greatest distance between the ends is the length; the measurement around the thickest part, the girth. For example: a package 36 inches long, 12 inches wide and 6 inches high would measure 72 inches.

Unless otherwise instructed, all Parcel Post shipments are insured.

POST OFFICES AND ZONES ARIZONA POINTS

Post Office	Zone From		Post Office	Zone From		Post Office	Zone From		Post Office	Zone From	
	S.F.	L.A.		S.F.	L.A.		S.F.	L.A.		S.F.	L.A.
Ajo.....	5	4	Dos Cabezos.....	5	4	Jerome.....	4	4	Parker.....	4	3
Avondale.....	5	4	Douglas.....	5	4	Jerome Jct.....	4	4	Patagonia.....	5	4
Benson.....	5	4	Duquesne.....	5	4	Kelvin.....	5	4	Pearce.....	5	4
Biabe.....	5	4	Fairbank.....	5	4	Kingman.....	4	3	Phoenix.....	5	4
Bouse.....	4	3	Flagstaff.....	4	4	Mammoth.....	5	4	Prescott.....	4	4
Chloride.....	4	3	Florence.....	5	4	Maricopa.....	5	4	Quartzsite.....	4	3
Christmas.....	5	4	Gila Bend.....	5	4	Mayer.....	4	4	Ray.....	5	4
Chrysotile*.....	5	4	Gilbert.....	5	4	Mesa.....	5	4	Rice.....	5	4
Clarkdale.....	4	4	Gleeson.....	5	4	Miami.....	5	4	Roosevelt.....	5	4
Clifton.....	5	4	Glendale.....	5	4	Mohave City.....	4	3	Shults.....	5	4
Cochise.....	5	4	Globe.....	5	4	Mohawk.....	4	3	Simmons.....	4	3
Congress.....	4	3	Goodyear*.....	5	4	Morenci.....	5	4	Somerton.....	4	3
Congress Jct.....	4	3	Hackberry.....	4	3	Nogales.....	5	4	Stoddard.....	4	4
Copper Creek.....	5	4	Hayden.....	5	4	Oatman.....	4	3	Superior.....	5	4
Copper Hill.....	5	4	Hillside.....	4	3	Oldtrails*.....	4	3	Swansea.....	4	3
Courtland.....	5	4	Holbrook.....	5	4						
Crown King.....	4	4	Humboldt.....	4	4						

CALIFORNIA POINTS

Post Office	Zone From		Post Office	Zone From		Post Office	Zone From		Post Office	Zone From	
	S.F.	L.A.		S.F.	L.A.		S.F.	L.A.		S.F.	L.A.
Academy.....	2	3	Brentwood.....	1	3	Crockett.....	1	4	Felton.....	1	3
Acampo.....	2	4	Bridgeport.....	3	3	Crows Landing.....	2	3	Ferndale.....	3	4
Acton.....	4	1	Bridgeville.....	3	4	Cucamonga.....	4	1	Fieldbrook.....	3	4
Adin.....	3	4	Buckeye.....	3	4	Culver City.....	4	1	Fillmore.....	3	1
Aetna Springs.....	2	4	Buck Meadows.....	2	3	Cutler.....	3	3	Folsom City.....	2	4
Agnew.....	1	3	Bulwinkle.....	3	4	Daggett.....	4	2	Forbestown.....	2	4
Alameda.....	1	4	Burbank.....	4	1	Darwin.....	3	2	Forest.....	2	4
Albion.....	2	4	Burlingame.....	1	4	Davis.....	3	2	Foresthill.....	2	4
Alderpoint.....	3	4	Butte Meadows.....	3	4	Death Valley.....	4	3	Forestville.....	1	2
Alhambra.....	4	1	Byron.....	1	3	Del Rey.....	2	3	Fort Bragg.....	2	4
Allegany.....	2	4				Denair.....	2	3	Fort Seward.....	3	4
Allensworth.....	3	2	Calexico.....	4	3	De Saba.....	2	2	Fortuna.....	3	4
Alpine.....	4	2	Caliente.....	3	2	Dinuba.....	3	3	Fourth Crossing.....	2	3
Altadena.....	4	1	Calipatria.....	4	2	Dixon.....	1	4	Fowler.....	2	3
Altaville.....	2	3	Calistoga.....	2	4	Dorris.....	3	4	Franklin.....	2	4
Alton.....	3	4	Camino.....	2	4	Dos Palos.....	2	3	French Camp.....	2	3
Alturas.....	3	4	Campo Seco.....	2	3	Douglas City.....	3	4	French Gulch.....	3	4
Alvarado.....	1	4	Camptonville.....	2	4	Douglasflat.....	2	3	Freshwater.....	3	4
Amador City.....	2	3	Capay.....	2	4	Downey.....	4	1	Fresno.....	2	3
Amboy.....	4	2	Carlotia.....	3	4	Drytown.....	2	4	Fruitvale Sta.*.....	1	4
Anaheim.....	4	1	Carmel.....	2	3	Duarte.....	4	1	Fullerton.....	4	1
Anderson.....	3	4	Carpinteria.....	3	2	Ducor.....	3	2	Fulton.....	2	4
Andrade.....	4	4	Carson Hill.....	2	3	Dunnigan.....	2	4	Galt.....	2	4
Angels Camp.....	2	3	Caruthers.....	2	3	Dunsmuir.....	3	4	Garberville.....	3	4
Antioch.....	1	4	Casmalia.....	3	2	Dyerville.....	3	4	Gardena.....	4	1
Applegate.....	2	4	Caspar.....	2	4				Garden Grove.....	4	1
Arbuckle.....	2	4	Cement.....	1	4	East Auburn.....	2	4	Gazelle.....	3	4
Arcadia.....	4	1	Centerville.....	1	4	East Nicolaus.....	2	4	Genesee.....	3	4
Arcata.....	3	4	Ceres.....	2	3	East Pasadena*.....	4	1	Gerber.....	3	4
Armona.....	3	2	Chatsworth.....	3	1	East San Diego.....	4	2	Germantown.....	2	4
Atolia.....	3	2	Chico.....	2	4	East San Pedro.....	4	1	Geyserville.....	2	4
Atwater.....	2	3	Chinese Camp.....	2	3	East Wilmington.....	4	1	Giant.....	1	4
Auberry.....	3	3	Chino.....	4	1	El Cajon.....	4	2	Gilroy.....	2	3
Auburn.....	2	4	Chowchilla.....	2	3	El Centro.....	4	3	Glenblair.....	2	4
Avila.....	3	2	Claremont.....	4	1	El Dorado.....	2	4	Globe.....	3	2
Asus.....	4	1	Clearinghouse.....	2	3	Eldridge.....	1	4	Goffs.....	4	3
			Clements.....	2	4	Elk.....	2	4	Gonzales.....	2	3
Bagby.....	2	3	Clio.....	2	4	Elk Grove.....	2	4	Gorman*.....	3	1
Bakersfield.....	3	2	Cloverdale.....	2	4	Elmira.....	1	4	Grabners.....	2	3
Balboa.....	4	1	Cloverleaf.....	2	4	El Monte.....	4	1	Grafton.....	2	4
Baldwin Park.....	4	1	Clovis.....	2	3	El Portal.....	2	3	Grass Valley.....	2	4
Banning.....	4	2	Coachella.....	4	2	El Segundo.....	4	1	Greenview.....	3	4
Barstow.....	4	2	Coalinga.....	2	3	Elaine.....	4	2	Greenwood.....	2	4
Baypoint.....	1	4	Coarsegold.....	2	3	Emigrant Gap.....	2	4	Gridley.....	2	4
Bayside.....	3	4	Colfax.....	2	4	Empire.....	2	3	Grimes.....	2	4
Bel.....	4	1	Collinsville.....	1	4	Engle Mine.....	3	4	Groveland.....	2	3
Bella Vista.....	3	4	Colton.....	4	2	Escalon.....	2	3	Gualala.....	2	4
Bellflower.....	4	1	Columbia.....	2	3	Econdido.....	4	2	Guerneville.....	2	4
Bemica.....	1	4	Colusa.....	2	4	Esparto.....	2	4	Gustine.....	2	3
Berkley.....	1	4	Compton.....	4	1	Eureka.....	3	4	Hamilton City.....	2	4
Betteravia.....	3	2	Concord.....	1	4	Exchequer.....	2	3	Hammononton.....	2	4
Beverly Hills.....	4	1	Confidence.....	2	3	Exeter.....	3	2	Hanford.....	3	2
Big Creek.....	3	3	Copperopolis.....	2	3				Hat Creek.....	3	4
Biggs.....	2	4	Coram.....	3	4	Fairfield.....	1	4	Hawthorne.....	4	1
Bigpine.....	3	3	Corcoran.....	3	2	Fairmead.....	2	3	Hayward.....	1	4
Bigop.....	3	3	Cordelia.....	1	4	Fair Oaks.....	2	4	Healdsburg.....	2	4
Blairden.....	2	4	Corning.....	2	4	Falk.....	3	4	Helm.....	2	3
Blackburg.....	3	4	Corona.....	4	1	Fallon.....	1	4	Hemet.....	4	2
Blue Lake.....	3	4	Coronado.....	4	2	Fellows.....	3	2	Hermosa Beach.....	4	1
Blythe.....	4	3	Cotati.....	1	4						
Bostonia.....	4	2	Cottonwood.....	3	4						
Boulder Creek.....	1	3	Coulterville.....	2	3						
Bravley.....	4	3	Coutolenc.....	2	4						
Bra.....	4	1	Covina.....	4	1						
			Crescent City.....	3	4						

Note—Mark * after office designates a non-money order office and to which no C. O. D. can be sent.

POST OFFICES AND ZONES CALIFORNIA POINTS—Continued

Post Office	Zone From		Post Office	Zone From		Post Office	Zone From		Post Office	Zone From		Post Office	Zone From	
	S.F.	L.A.		S.F.	L.A.		S.F.	L.A.		S.F.	L.A.		S.F.	L.A.
Loleta.....	3	4	New Almaden.....	1	3	Port Costa.....	1	4	Santa Maria.....	3	2	Tropico Branch.....	4	1
Lompoc.....	3	2	Newark.....	1	4	Porterville.....	3	2	Santa Monica.....	4	1	Truckee.....	2	4
Lone Pine.....	3	3	Newbury Park.....	3	1	Portola.....	3	4	Santa Paula.....	3	2	Tulare.....	3	4
Long Beach.....	4	1	Newcastle.....	2	4	Princeton.....	2	4	Santa Rosa.....	1	4	Tuolumne.....	2	3
Loomis.....	2	4	Newhall.....	3	1	Puente.....	4	1	Santa Susana.....	3	1	Tullock.....	2	3
Lordsburg.....	4	1	Newman.....	2	3	Quartz.....	2	3	Saratoga.....	1	3	Tuscan.....	3	4
Los Alamitos.....	4	1	Newport Beach.....	4	1	Quincy.....	2	4	Sargent.....	2	3	Tuttletown.....	2	3
Los Alamos.....	3	2	Niles.....	1	3	Randsburg.....	3	2	Saugus.....	3	1	Twain.....	3	4
Los Angeles.....	4	Local	North Bloomfield.....	2	4	Raymond.....	3	2	Sausalito.....	1	4	Ukiah.....	2	4
Los Banos.....	2	3	N. Cucamonga.....	4	1	Red Bluff.....	3	4	Sawtelle.....	4	1	Universal City.....	4	1
Los Gatos.....	1	3	North Fork.....	2	3	Redondo Beach.....	4	1	Scales.....	2	4	Upland.....	4	1
Los Molinos.....	3	2	N. Pomona*.....	4	1	Redwood City.....	3	3	Scotia.....	3	4	Upper Lake.....	2	4
Lost Hills.....	2	4	N. San Diego.....	4	2	Redlands.....	4	2	Sebastopol.....	1	4	Vacaville.....	1	4
Lovelock.....	2	4	Normal.....	4	1	Redondo Beach.....	4	1	Selma.....	2	3	Vallejo.....	1	4
Loyalton.....	3	4	Oak.....	3	4	Redwood City.....	3	3	Shasta.....	3	4	Valley Springs.....	2	3
McCloud.....	3	4	Oakdale.....	2	3	Redwood City.....	3	3	Shawmut.....	2	3	Vallicita.....	2	3
McKittrick.....	3	2	Oakhurst.....	2	3	Reedley.....	3	3	Sheep ranch.....	2	4	Van Nuys.....	4	1
Madera.....	2	2	Oakland.....	1	4	Requa.....	3	4	Sheridan.....	2	4	Varain.....	2	3
Madrone.....	2	1	Oakley.....	1	3	Rialto.....	4	2	Sherman.....	4	1	Venice.....	4	1
Magalia.....	1	2	Oak Park*.....	2	4	Richmond.....	2	4	Sierra City.....	2	4	Ventura.....	3	2
Malaga.....	2	2	Oakville.....	1	4	Richvale.....	3	4	Sierra Madre.....	4	1	Vina.....	2	4
Malibu.....	2	2	Occidental.....	1	4	Rio Dell.....	3	4	Simons.....	4	1	Viola.....	3	4
Manitoba.....	2	2	Ocean Beach.....	4	2	Rio Vista.....	1	4	Sisson.....	3	4	Visalia.....	3	2
Maricopa.....	2	2	Oceanside.....	4	2	Ripon.....	3	3	Skidoo.....	3	2	Vorden.....	1	4
Marigold.....	2	2	Oilcenter.....	3	2	Riverbank.....	3	2	Slatington.....	2	4	Walnut Creek.....	1	4
Mariposa.....	2	2	Oilfield.....	3	2	Riverside.....	4	2	Sloat.....	2	4	Walnut Grove.....	1	4
Martell.....	2	2	Oildale.....	2	3	Rocklin.....	3	4	Smartville.....	2	4	Wasco.....	3	4
Martinez.....	1	1	Oilfields.....	3	2	Roseville.....	2	4	Smithflat.....	2	4	Washington.....	2	4
Marysville.....	1	1	Ojai.....	3	2	Round Valley.....	3	3	Smith River.....	2	3	Waterford.....	2	3
Maxwell.....	1	1	Oleander.....	2	4	Rutherford.....	1	4	Snelling.....	2	3	Watsonville.....	2	3
Mayfield.....	1	3	Oleum.....	1	4	Ryan.....	3	2	Soledad.....	2	3	Watts.....	4	1
Meadow Valley.....	1	3	O'Neals.....	2	4	Sacramento.....	2	4	Sonoma.....	1	4	Weed.....	3	4
Melones.....	4	4	Ontario.....	4	1	St. Helena.....	4	4	Soquel.....	2	3	West Alhambra.....	4	1
Mendocino.....	4	4	Orange.....	4	1	Salida.....	2	2	Soulsbyville.....	2	3	Westpoint.....	2	3
Mendota.....	2	2	Orange Cove.....	3	3	Salinas.....	3	3	S. Pasadena Br.....	4	1	Westwood.....	3	4
Menlo Park.....	1	3	Orcutt.....	3	2	Samoa.....	3	3	S. San Francisco.....	1	4	Wheatland.....	3	4
Merced.....	1	3	Orick.....	3	2	San Andreas.....	3	3	Spreckels.....	2	4	White River.....	3	2
Merced Falls.....	2	2	Orland.....	2	4	San Benito.....	2	3	Spring Garden.....	2	4	Whittier.....	4	1
Metropolitan.....	2	2	Orosi.....	3	3	San Bernardino.....	4	2	Stagg.....	2	3	Wilbur Springs.....	2	4
Middletown.....	1	4	Oroville.....	2	4	San Bruno.....	1	4	Standard.....	2	3	Wildomar.....	2	4
Millbrae.....	1	4	Owensmouth.....	3	1	San Diego.....	4	2	Scent.....	2	3	Williams.....	2	4
Millsaps.....	1	4	Ornard.....	3	2	San Dimas.....	4	1	Stirling City.....	2	3	Willits.....	2	4
Milton.....	4	4	Pacific Grove.....	2	3	San Fernando.....	4	1	Stockton.....	3	2	Willows.....	4	1
Mina.....	4	4	Palermo.....	2	4	San Francisco.....	Local	4	Stone Canon.....	3	2	Wilmington.....	4	1
Mineral.....	4	4	Palmdale.....	3	1	San Gabriel.....	4	1	Strathmore.....	1	4	Windsor.....	2	4
Mitchell Mill.....	1	3	Palo Alto.....	1	3	Sanger.....	2	3	Suisun City.....	1	4	Winehaven.....	1	4
Modesto.....	2	2	Paradise.....	2	4	San Joaquin.....	1	3	Sultana.....	1	3	Winters.....	2	4
Mojave.....	3	3	Parlier.....	2	3	San Jose.....	1	3	Sunnyvale.....	3	3	Winthrop.....	3	4
Mokelumne Hill.....	4	4	Pasadena.....	4	1	San Juan Bautista.....	2	1	Susanville.....	2	3	Winton.....	2	4
Monrovia.....	2	3	Patterson.....	2	3	San Luis Obispo.....	1	3	Sutter Creek.....	2	3	Woodbridge.....	3	2
Montague.....	4	4	Paynes Creek.....	3	4	San Mateo.....	3	4	Taft.....	3	2	Woodlake.....	2	4
Montebello.....	4	4	Payson.....	2	4	San Miguel.....	2	3	Tehachapi.....	3	2	Woodland.....	2	4
Monterey.....	1	3	Penryn.....	2	4	San Pedro.....	4	1	Tehama.....	3	2	Yankee Hill.....	2	4
Morgan Hill.....	1	3	Perris.....	4	2	San Quentin.....	1	4	Terra Bella.....	3	2	Yermo.....	4	2
Mountain King.....	1	3	Petaluma.....	4	1	San Rafael.....	2	3	Thornton.....	2	4	Yolo.....	2	4
Mountain View.....	1	3	Pico Heights Sta.*.....	4	1	San Simeon.....	2	3	Tipton.....	3	2	Yosemite.....	2	3
Murphy.....	1	3	Pittsburg.....	4	1	Santa Ana.....	4	1	Torrance.....	4	1	Yountville.....	1	4
Murrieta.....	4	2	Pixley.....	2	4	Santa Barbara.....	1	3	Towle.....	2	3	Yreka.....	3	4
Napa.....	1	4	Placerville.....	1	3	Santa Clara.....	3	2	Tracy.....	2	3	Yuba City.....	2	4
Natoma.....	2	4	Pleasanton.....	2	3	Santa Cruz.....	2	3	Tree Pinos.....	3	4	Zamora.....	2	4
Navarro.....	2	4	Plymouth.....	4	2				Trinidad.....	3	4	Zenia.....	3	4
Needles.....	4	3	Point Loma.....	4	1				Trona.....	3	2			
Nevada City.....	2	4	Pomona.....	4	1									
			Pope Valley.....	2	4									

NEVADA POINTS

Post Office	Zone From		Post Office	Zone From		Post Office	Zone From		Post Office	Zone From		Post Office	Zone From	
	S.F.	L.A.		S.F.	L.A.		S.F.	L.A.		S.F.	L.A.		S.F.	L.A.
Arden.....	4	3	East Ely.....	4	4	Kennedy.....	3	4	Olinghouse.....	3	4	Sodaville.....	3	3
Aurora.....	3	3	Ely.....	4	4	Kimberly.....	4	4	Oreana.....	3	4	Sparks.....	3	4
Austin.....	3	4	Eureka.....	4	4	Las Vegas.....	4	3	Oseola.....	4	4	Sutro.....	2	4
Battle Mtn.....	4	4	Fairview.....	3	4	Lovelocks.....	3	4	Palisade.....	4	4	Sweetwater.....	3	3
Beatty.....	3	3	Fallon.....	3	4	Lower Rochester.....	3	3	Pioche.....	4	4	Thompson.....	3	4
Belmont.....	3	4	Gardnerville.....	2	4	Ludwig.....	3	3	Pioneer.....	3	3	Thorne.....	3	3
Beowawe.....	3	3	Goldconda.....	3	3	Luning.....	3	3	Rawhide.....	3	3	Tonopah.....	3	3
Bonnie Clare.....	3	3	Goldfield.....	2	4	McGill.....	4	4	Red House.....	4	4	Tungsten Mines*.....	4	4
Bruner*.....	3	4	Gold Hill.....	2	4	Manhattan.....	3	3	Reno.....	3	4	Tuscarora.....	4	4
Bullion.....	4	4	Good Springs.....	4	3	Mason.....	3	3	Rhyolite.....	3	3	Union Mines.....	4	4
Caliente.....	4	4	Hawthorne.....	3	3	Mesa.....	4	4	Rochester.....	3	4	Verdi.....	3	4
Carlin.....	4	4	Hazen.....	3	4	Mill City.....	3	4	Round Mtn.....	3	3	Virginia City.....	2	4
Carson City.....	2	4	Hornsilver.....	3	3	Millers.....	3	3	St. Thomas.....	4	3	Wabuska.....	3	4
Cobre.....	4	4	Hudson.....	3	3	Mina.....	2	4	Schurz.....	3	3	Wadsworth.....	3	4
Contact.....	4	4	Imlay.....	3	4	Minden.....	2	4	Searchlight.....	4	3	Wellington.....	3	4
Dayton.....	2	4	Jarbridge.....	4	4	Mound House.....	2	4	Sevens Troughs.....	3	4	Wells.....	4	4
Dyer.....	3	3	Johnnie.....	4	3	Nelson.....	4	3	Sheepshead.....	3	4	Winnemucca.....	3	4
						Nixon.....	3	4	Sheridan.....	3	4	Wonder.....	3	4
									Shoshone.....	2	4	Yerington.....	3	3
									Silver City.....	2	4			

Note—Mark * after office designates a non-money order office and to which no C. O. D. can be sent.

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1	1 & 2	1 & 2	91	30	29	180	59	59	263	87	173	351	95	111	441	129	147
2	2	2	92	31	30	180½	59	59	264	87	173	352	96	112	442	130	148
3	3	3	93	32	31	181	59	59	265	89	93	353	96	*	443	130	148
4	3 & 4	3 & 4	94	31	30	182	60	*	266	89	93	354	95	111	444	130	148
5	5	5	95	32	31	183	60	*	267	89	93	355	95	111	445	130	148
6	6	6	96	100	221	184	60	*	268	89	93	356	96	112	446	130	148
7	6	5	97	33	32	185	62	73	269	89	92	357	106	114	447	130	*
8	7	6	98	34	33	186	62	73	270	89	92	358	107	115	448	131	149
9	8	6	99	34	33	187	61	73	271	90	92	359	108	116	449	131	149
10	8	*	100	35	34	188	61	73	272	90	92	360	108	116	450	131	149
11	9	7	101	35	*	189	63	72	273	90	92	361	109	117	451	131	*
12	9	8	102	36	36	190	63	*	274	90	92	362	109	117	452	131	149
13	10	7	103	36	36	191	63	72	275	90	92	363	109	117	453	131	149
14	10	7	104	36	35	191½	64	62	276	90	92	364	110	118	454	132	150
15	11	9	105	37	41	192	700	808	277	90	92	365	110	118	455	133	151
16	11	9	106	37	41	192½	64	62	278	90	92	366	111	119	456	134	155
17	10	8	107	38	44	193	65	60	279	90	92	367	111	119	457	134	152
18	12	9	108	38	44	193½	66	61	280	90	92	368	111	119	458	134	152
19	12	10	109	39	45	194	67	63	281	90	93	369	112	*	459	135	154
20	12	10	110	39	45	195	68	66	282	90	92	370	112	120	460	136	156
21	13	11	111	40	47	196	68	*	283	92	88	371	112	121	461	136	156
22	13	10	112	40	47	197	68	*	284	92	88	372	112	121	462	136	156
23	13	11	113	40	47	198	67	64	285	92	88	373	113	121	463	136	156
24	13	11	114	41	204	199	67	64	286	92	88	374	113	121	464	136	156
25	13	11	115	41	204	200	68	*	287	92	88	375	113	122	465	136	157
26	14	10	116	42	46	201	68	66	287½	92	89	376	113	*	466	137	157
27	14	14	117	42	46	202	68	66	288	91	88	377	114	122	467	137	157
28	14	12	118	42	40	203	69	68	289	93	*	378	114	*	468	137	157
29	14	12	119	42	40	204	69	*	290	93	95	379	114	122	469	137	159
30	15	*	120	43	47	205	70	67	291	93	91	380	115	*	470	137	159
31	15	13	121	43	43	206	70	67	291½	93	91	381	115	122	471	137	159
32	15	13	122	44	37	207	71	65	292	94	94	382	115	120	472	138	158
33	15	13	123	44	38	208	71	65	293	94	94	383	115	123	473	138	158
34	16	13	124	44	38	209	72	70	294	94	96	384	116	*	474	138	158
35	16	14	125	44	138	210	73	70	295	94	96	385	116	123	475	138	158
36	16	14	126	44	38	211	73	69	296	94	96	386	117	123	476	138	160
37	16	*	127	44	37	212	73	70	297	95	111	387	116	*	477	138	160
38	17	*	128	44	37	213	74	175	298	98	97	388	117	129	478	139	163
39	17	16	129	44	36	214	74	175	299	98	100	389	116	122	479	139	163
40	17	*	130	45	42	215	74	175	300	98	101	390	118	127	480	139	163
41	17	16	131	45	42	216	74	176	301	98	101	391	118	127	481	139	163
42	17	16	132	46	34	217	75	174	302	98	99	392	119	128	482	139	163
43	18	16	133	46	34	218	75	174	303	99	99	393	119	128	483	140	*
44	18	*	134	46	37	219	75	175	304	99	101	394	117	129	484	140	160
45	18	*	135	47	36	220	75	*	305	99	99	395	120	132	485	140	160
46	18	*	136	47	*	221	75	175	306	99	101	396	120	*	486	140	160
47	19	*	137	47	39	222	77	78	307	100	103	397	117	129	487	140	161
48	19	17	138	47	38	222½	78	*	308	100	103	398	120	132	488	140	161
49	19	15	139	47	38	223	77	78	309	100	103	399	121	135	489	140	161
50	19	15	140	47	39	223½	78	*	310	100	102	400	121	135	490	141	161
51	19	17	141	48	40	224	77	78	311	100	102	401	122	136	491	141	161
52	20	*	142	48	39	224½	78	*	312	100	102	402	122	136	492	141	161
53	20	*	142½	48	39	225	77	78	313	100	102	403	122	*	493	141	165
54	20	17	143	48	39	226	83	184	314	100	102	404	122	141	494	141	165
55	20	17	144	49	49	227	83	184	315	101	106	405	123	139	495	142	164
56	20	*	145	49	49	228	83	184	316	101	106	406	123	139	496	142	164
57	21	18	146	50	50	229	83	184	317	101	106	407	123	141	497	142	165
58	21	18	147	50	50	230	83	184	318	101	106	408	123	141	498	142	164
59	21	18	148	50	50	231	80	80	319	101	106	409	123	138	499	143	166
60	21	18	149	50	50	232	80	80	320	103	97	410	123	138	500	144	167
61	22	19	150	51	51	233	80	80	321	103	104	411	123	138	501	144	167
62	22	19	151	51	51	234	80	80	322	103	105	412	124	130	502	144	167
63	22	19	152	51	51	235	80	80	323	103	98	413	124	130	503	144	167
64	22	20	153	51	51	236	79	79	324	103	98	414	124	142	504	144	167
65	23	21	154	51	51	237	82	82	325	103	105	415	125	126	505	143	166
66	23	21	155	51	51	238	82	82	326	103	105	416	125	126	506	143	166
67	23	21	156	52	52	239	82	82	327	104	104	417	125	126	507	143	166
68	24	22	157	52	52	240	81	81	328	104	104	418	125	126	508	143	166
69	24	22	158	52	52	241	76	77	329	104	104	419	125	143	509	145	168
70	24	22	159	52	52	242	76	77	330	104	104	420	126	143	510	147	170
71	25	23				243	76	77	331	104	104	421	126	142	511	147	170
72	25	23	161	53	53	244	84	84	332	104	104	422	126	142	512	147	170
73	25	25	162	53	53	245	84	84	333	104	103	423	126	143	513	148	172
74	25	23	163	54	54	246	84	84	334	105	*	424	126	143	514	148	172
75	26	24	164	54	54	247	84	83	335	102	110	425	126	142	515	149	175
76	26	25	165	54	54	248	85	85	336	102	110	426	127	145	516	148	172
77	26	24	166	55	55	249	85	85	337	102	110	427	127	145	517	148	172
78	26	24	167	55	56	250	85	85	338	102	110	428	127	145	518	149	175
79	27	24	168	55	55	251	85	85	339	102	110	429	127	145	519	150	173
80	27	25	169	56	56	252	85	85	340	102	1105	430	127	145	520	150	174
81	27	25	170	56	57	253	85	85	341	102	105	431	127	145	521	150	174
82	27	23	171	56	56	254	85	85	342	105	108	432	127	145	522	152	177
83	28	26	172	57	57	255	85	85	343	105	108	433	127	145	523	152	177
84	28	26	173	57	57	256	86	196	344	105	108	434	127	145	524	152	177
85	28	26	174	57	57	257	86	198	345	97	109	435	128	146	525	152	177
86	29	28	175	57	57	258	87	196	346	97	109	436	12				

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531	146	160	623	176	207	712	197	228	822	215	252	912	238	•	1002	266	286
532	146	160	624	176	206	713	197	229	823	215	252	913	238	•	1003	266	286
533	146	160	625	176	207	714	197	229	824	216	553	914	239	260	1004	266	286
534	145	168	626	176	206	715	197	229	825	216	553	915	239	260	1005	266	286
535	145	168	627	177	207	716	198	230	826	216	•	916	239	260	1006	266	286
536	145	168	628	177	207	717	198	230	827	217	554	917	239	259	1007	267	287
537	145	168	629	177	•	718	198	230	828	217	554	918	239	260	1008	267	287
538	156	•	630	177	•	719	199	231	829	217	554	919	240	262	1009	267	287
539	156	†184	631	177	•	720	199	232	830	218	555	920	240	262	1010	267	287
540	156	†184	632	177	•	721	199	232	831	218	555	921	240	262	1011	267	287
541	156	†184	633	177	•	722	200	231	832	218	555	922	241	263	1012	267	287
542	156	†184	634	177	•	723	200	231	833	219	556	923	241	263	1013	267	287
543	156	†184	635	177	•	724	200	225	834	219	556	924	244	264	1014	267	287
544	156	†184	636	177	•	725	200	225	835	219	556	925	244	264	1015	267	287
545	157	185	637	175	205	726	200	232	836	220	557	926	244	264	1016	267	287
546	157	185	637½	•	205	727	200	•	837	218	555	927	244	264	1017	268	288
547	157	185	638	175	205	728	200	232	838	220	557	928	245	265	1018	268	288
548	157	179	639	178	208	729	201	224	839	223	560	929	245	265	1019	261	282
549	158	180	640	178	208	730	203	234	840	220	557	930	246	266	1020	261	282
550	158	180	641	179	209	731	203	234	841	221	558	931	246	266	1021	265	289
551	158	180	642	181	211	732	203	234	842	221	558	932	246	266	1022	265	289
552	158	180	643	181	211	733	201	•	843	221	558	933	248	268	1023	265	289
553	158	180	644	179	209	734	201	236	844	222	559	934	248	268	1024	265	289
554	160	182	645	180	210	735	201	236	845	222	559	935	248	268	1025	269	290
555	161	182	646	180	210	736	202	234	846	222	559	936	248	268	1026	269	290
556	155	186	647	178	208	737	202	236	847	222	559	937	248	268	1027	269	290
557	155	†186	648	182	212	738	203	†237	848	223	560	938	248	268	1028	269	290
558	154	†186	649	182	212	739	203	†237	849	224	561	939	249	269	1029	269	290
559	162	•	650	183	214	740	202	233	850	224	561	940	249	269	1030	270	291
560	162	•	651	183	214	741	204	235	851	223	560	941	249	269	1031	270	291
561	162	•	652	183	214	742	204	235	852	224	561	942	249	269	1032	271	292
562	162	•	653	183	213	743	204	235	853	225	562	943	249	269	1033	271	292
563	162	•	654	183	213	744	204	236	854	225	562	944	250	270	1034	272	293
564	162	•	655	184	215	745	205	242	855	225	562	945	250	270	1035	272	293
565	162	187	655½	•	215	746	205	242	856	226	563	946	250	270	1036	274	296
566	162	187	656	•	215	747	205	242	857	226	563	947	251	271	1037	274	296
567	162	187	657	184	215	748	205	241	858	226	563	948	251	271	1038	274	296
568	163	188	658	184	215	749	205	241	859	227	564	949	251	271	1039	274	296
569	163	188	660	184	215	750	205	241	860	227	564	950	251	271	1040	275	297
570	163	188	661	184	215	751	205	241	861	227	564	951	252	272	1041	274	296
571	165	190	662	185	216	752	205	241	862	228	565	952	253	273	1042	274	296
572	165	190	662A	186	217	753	206	240	863	228	565	953	252	272	1043	275	297
573	164	189	662B	186	217	754	206	240	864	228	565	954	251	271	1044	275	297
574	164	189	663	185	216	755	206	240	865	230	567	955	253	273	1045	275	297
575	164	189	664	186	217	756	206	240	866	229	566	956	254	275	1046	275	297
576	163	188	665	185	216	757	206	240	867	229	566	957	254	275	1047	275	297
577	163	188	667	187	218	758	206	239	868	229	566	958	254	275	1048	275	297
578	164	189	668	187	218	759	206	239	869	229	566	959	254	275	1049	275	297
579	164	189	669	187	218	760	206	239	870	227	564	960	254	275	1050	275	297
580	164	189	671	187	213	761	208	239	871	230	567	961	255	276	1051	276	295
581	164	189	672	188	•	762	208	239	872	230	567	962	255	276	1052	276	295
582	165	190	673	188	•	763	208	•	873	230	567	963	256	†277	1053	276	295
583	165	190	674	188	•	764	208	238	874	230	567	964	256	277	1054	276	295
584	166	191	675	189	210	765	208	243	875	231	568	965	256	277	1055	276	295
585	166	191	676	189	210	766	208	243	876	231	568	966	277	298	1056	276	295
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587	166	191	678	189	210	768	207	238	878	232	569	968	277	298	1058	242	261
588	166	191	679	189	210	769	207	238	879	232	569	969	278	299	1059	242	261
589	167	192	680	189	210	770	207	238	880	232	569	970	278	299	1060	242	261
590	167	192	681	190	220	771	207	238	881	232	569	971	278	299	1061	242	•
591	167	192	682	190	220	772	207	240	882	233	570	972	278	299	1062	243	261
592	168	195	683	190	220	773	209	244	883	233	570	973	279	300	1063	243	261
593	168	195	684	190	220	774	209	•	884	233	570	974	279	300	1064	243	•
594	169	194	685	191	222	775	209	245	885	233	570	975	279	300	1065	243	•
594½	169	194	686	191	222	776	209	245	886	234	571	976	279	300	1066	273	294
595	168	195	687	191	223	777	209	245	887	234	571	977	279	300	1067	281	†302
596	170	197	688	192	223	778	209	245	888	234	571	978	280	301	1068	281	†302
597	170	197	689	192	223	779	209	245	889	234	571	979	280	301	1069	281	302
598	170	197	690	192	223	800	209	245	890	233	570	980	280	301	1070	281	302
599	171	203	691	192	223	801	210	244	891	233	570	981	257	278	1071	281	303
600	171	200	692	193	•	802	210	244	892	233	570	982	258	280	1072	281	303
601	171	200	693	193	•	803	210	247	893	233	570	983	260	279	1073	281	303
602	171	200	694	193	•	804	210	248	894	233	570	984	259	281	1074	282	303
603	171	200	695	194	224	805	211	247	895	234	571	985	259	281	1075	283	306
604	171	200	696	194	224	806	211	247	896	234	571	986	257	278	1076	284	307
605	172	203	697	194	224	807	211	247	897	234	571	987	257	278	1077	285	305
606	172	203	698	194	225	808	211	247	898	234	571	988	262	284	1078	285	305
607	173	199	699	194	225	809	213	250	899	236	•	989	263	285	1079	285	305
607½	173	199	700	195	226	810	213	250	900	236	255	990	263	285	1080	285	305
608	172	198	701	195	226	811	213	249	901	236	256	991	263	285	1081	285	

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1625	449	484	1711	470	505	1800	492	530	1888	521	573	1978	549	607	2067	580	639
1626	449	486	1712	470	505	1801	492	530	1889	521	573	1979	548	606	2068	580	639
1627	450	485	1713	471	506	1802	493	531	1890	521	573	1979½	548	607	2069	580	639
1628	450	485	1714	471	506	1803	493	531	1891	515	574	1980	548	606	2070	580	639
1629	450	485	1715	471	506	1804	493	531	1892	516	575	1980	549	607	2071	580	639
1630	450	485	1716	469	504	1805	494	532	1893	516	575	1982	543	601	2072	608	666
1631	450	485	1717	469	504	1806	494	532	1894	517	576	1983	544	602	2073	608	666
1632	451	*	1718	474	510	1807	494	532	1895	517	576	1984	544	602	2074	581	719
1632½	451	486	1719	474	510	1808	495	533	1896	517	576	1985	544	602	2075	581	719
1633	451	486	1720	474	510	1809	495	533	1897	518	577	1986	544	602	2076	581	719
1634	451	486	1721	474	510	1810	495	533	1898	518	577	1987	544	602	2077	581	719
1635	451	486	1722	475	511	1811	496	534	1899	518	577	1988	544	602	2078	581	719
1636	451	486	1723	475	511	1812	496	534				1989	545	603	2079	578	637
1637	451	486	1724	475	511	1812	606	667	1900	518	577	1990	545	603	2080	578	637
1638	453	488	1725	475	511	1813	496	534	1901	518	577	1991	550	608	2081	578	637
1639	453	488	1726	476	512	1814	496	534	1902	519	578	1992	550	608	2082	578	637
1640	452	487	1727	476	512	1815	499	537	1903	519	578	1993	550	608	2083	578	637
1641	452	487	1728	476	512	1816	499	537	1904	519	578	1995	551	609	2084	579	638
1642	452	487	1729	476	512	1817	499	537	1905	532	590	1996	552	610	2085	579	638
1643	454	489	1730	473	509	1818	499	537	1906	532	590	1997	553	612	2086	579	638
1644	454	489	1731	473	509	1819	498	536	1907	532	590	1998	553	612	2087	579	638
1645	454	489	1732	473	509	1820	498	536	1908	532	579	1999	554	613	2088	580	639
1646	456	491	1733	473	*	1821	497	535	1909	522	579				2089	580	639
1647	456	491	1734	473	*	1822	497	535	1910	522	579	2000	554	613	2090	582	641
1648	457	492	1735	472	507	1823	497	535	1911	523	580	2001	555	614	2091	582	641
1649	457	492	1736	477	513	1824	497	535	1912	523	580	2002	555	614	2092	582	641
1650	457	492	1737	477	513	1825	497	535	1913	523	580	2003	555	614	2093	582	641
1650½	458	493	1738	477	513	1826	497	535	1914	524	581	2004	555	614	2094	582	641
1651	458	493	1739	477	513	1827	497	535	1915	524	581	2005	555	614	2095	582	641
1651½	458	493	1740	478	514	1828	498	536	1916	524	581	2006	555	614	2096	582	641
1652	458	493	1741	478	514	1829	504		1917	525	582	2007	555	614	2097	583	643
1653	459	494	1742	478	514	1830	504	543	1918	525	582	2008	555	614	2098	583	643
1654	459	494	1743	478	514	1831	504	543	1919	526	583	2009	555	*	2099	583	643
1655	460	495	1744	478	514	1832	505	544	1920	526	583	2010	555	614			
1656	460	495	1745	478	514	1833	505	544	1921	527	584	2011	556	615	2100	584	642
1657	460	495	1746	479	*	1834	505	544	1922	527	584	2012	556	615	2101	584	642
1658	460	495	1747	479	515	1835	505	544	1923	528	585	2013	560	619	2102	586	645
1659	461	496	1748	480	516	1836	503	542	1924	528	585	2014	561	620	2103	586	645
1660	461	496	1749	480	516	1837	503	542	1925	529	587	2015	561	620	2104	586	645
1661	462	500	1750	480	516	1838	503	542	1926	529	587	2016	561	620	2105	586	645
1662	462	500				1839	503	542	1927	529	587	2017	562	621	2106	586	645
1663	462	500	1751	480	516	1840	506	545	1928	529	587	2018	562	621	2107	586	645
1664	462	500	1752	480	516	1841	506	545	1929	530	588	2019	562	621	2108	585	640
1665	462	500	1753	482	518	1842	506	545	1930	530	588	2020	563	617	2109	585	640
1666	462	500	1754	482	518	1843	506	545	1931	531	589	2021	563	622	2110	584	644
1667	462	500	1755	482	518	1844	506	545	1932	531	589	2022	563	201, 622	2111	584	644
1668	456	491	1756	482	*	1845	506	545	1933	533	591	2023	568	627	2112	584	644
1669	461	499	1757	482	518	1846	508	547	1934	533	591	2024	568	627	2113	587	646
1670	461	499	1758	482	518	1847	508	547	1935	534	592	2025	568	627	2114	587	646
1671	464	498	1759	483	*	1848	508	547	1935½	534	592	2026	568	627	2115	587	646
1672	464	498	1760	483	519	1849	507	546	1937	535	593	2027	568	627	2116	588	*
1673	464	498	1761	483	519	1850	507	546	1938	535	593	2028	568	627	2117	588	647
1674	464	498	1762	483	347				1939	535	593	2029	571	630	2118	588	647
1675	465	496	1763	483	519	1851	500	538	1940	535	593	2030	571	630	2119	589	647
1676	465	499	1764	483	519	1852	500	538	1941	536	594	2031	571	630	2120	589	647
1677	465	*	1765	483	519	1853	500	538	1942	536	594	2032	570	629	2121	589	647
1678	465	499	1766	483	347	1854	501	539	1943	534	592	2033	570	629	2122	589	647
1679	465	499	1767	481	517	1855	501	539	1944	534	592	2034	566	625	2123	589	647
1680	465	496	1768	481	517	1856	501	539	1945	533	591	2035	567	626	2124	590	648
1681	463	497	1769	484	520	1857	501	539	1946	533	591	2036	567	626	2125	590	648
1682	463	497	1770	484	520	1858	501	539	1947	537	595	2037	567	626	2126	590	648
1683	463	497	1771	484	520	1859	501	539	1948	537	595	2038	567	626	2127	590	648
1684	466	501	1772	484	520	1860	502	541	1949	537	595	2039	567	626	2128	590	648
1685	466	501	1773	485	521	1861	502	541	1950	538	596	2040	572	631	2129	590	648
1686	466	501	1774	485	521	1862	502	541	1951	538	596	2041	573	632	2130	591	649
1687	466	501	1775	485	521	1863	503	542	1952	538	596	2042	572	631	2131	591	649
1688	466	501	1776	485	521	1864	509	548	1953	538	596	2043	573	632	2132	591	649
1689	466	501	1777	485	521	1865	509	548	1954	537	595	2044	575	634	2133	591	649
1690	466	501	1778	485	521	1866	509	548	1955	536	594	2045	575	634	2134	594	654
1691	467	502	1779	485	521	1867	510	549	1956	539	597	2046	575	634	2135	595	655
1692	467	502	1780	485	521	1868	512	549	1957	540	598	2047	575	634	2136	596	656
1693	467	502	1781	486	522	1869	512	551	1958	540	598	2048	574	633	2137	596	656
1694	467	502	1782	486	522	1870	512	551	1959	540	598	2049	574	633	2137½	597	657
1695	468	503	1783	486	522	1871	513	552	1960	540	598	2050	574	633	2138½	597	657
1696	468	503	1784	486	522	1872	513	552	1961	541	599	2051	574	633	2139	598	658
1697	468	503	1785	486	522	1873	513	552	1962	541	599	2052	576	635	2140	598	658
1698	468	503	1786	486	522	1874	514	553	1963	542	600	2053	576	635	2141	598	658
1699	468	503	1787	484	520	1875	514	553	1964	542	600	2054	573	632	2142	598	658

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2155	593	651	2243	630	691	2332	615	676	2423	646	707	2513	212	246	3583	724	828
2156	592	653	2244	630	691	2333	634	690	2424	646	707	2514	212	246	3584	724	828
2157	592	653	2245	631	692	2335	634	690	2425	646	707	2515	212	246	3585	724	828
2158	592	652	2246	631	692	2336	619	680	2426	646	707	2516	212	246	3586	725	830
2159	592	652	2247	631	692	2337	619	680	2427	646	707	2517	212	246	3587	725	830
2160	600	660	2248	631	692	2338	620	681	2428	646	707				3588	725	830
2161	600	660	2248½	631	692	2339	620	681	2429	646	707	3500	704	801	3589	725	831
2162	600	660	2249	631	692	2340	620	681	2430	647	708	3501	704	801	3590	727	832
2163	600	660	2250	631	692	2341	621	682	2431	647	708	3502	703	801	3591	727	831
2164	600	660	2251	631	692	2342	621	682	2432	647	708	3503	703	800	3592	727	822
2165	600	660	2252	631	692	2343	621	682	2433	647	708	3504	704	801	3593	719	821
2166	601	661	2253	631	692	2344	635	695	2435	648	709	3505	703	801	3594	719	821
2167	601	661	2254	631	692	2345	635	695	2436	651	712	3506	703	802	3595	729	834
2168	601	661	2255	631	692	2346	635	695	2437	650	711	3507	704	802	3596	729	834
2169	601	661	2256	631	692	2347	635	695	2438	649	710	3508	703	802	3597	729	834
2170	601	661	2257	631	692	2348	635	695	2439	649	710	3509	706	802	3598	729	835
2171	601	661	2258	631	692	2349	635	695	2440	653	714	3510	705	803	3599	730	835
2172	599	659	2259	631	692	2350	635	695	2441	653	714	3511	705	803			
2173	599	659	2260	631	692	2351	635	695	2442	652		3512	705	803	3600	730	834
2174	599	659	2261	632	693	2352	635	695	2443	652	713	3513	705	803	3601	730	835
2175	599	659	2262	632	693	2353	635	695	2444	652	713	3514	705	804	3602	731	836
2176	599	659	2263	632	693	2354	635	695	2445	652	713	3515	706	805	3603	731	836
2177	599	659	2264	632	693	2355	635	695	2446	654	715	3516	706	804	3604	731	836
2178	599	659	2265	632	693	2356	635	695	2447	654	715	3517	707	806	3605	732	837
2179	599	659	2265½	632	693	2357	635	695	2448	654	715	3518	707	806	3606	732	838
2180	606	667	2266	632	693	2358	635	695	2449	658	720	3519	707	806	3607	732	838
2181	606	667	2267	632	693	2359	636	696	2450	658	720	3520	707	806	3608	732	838
2182	606	667	2268	632	693	2360	636	696	2451	659	721	3521	707	806	3609	733	840
2183	606	667	2269	632	693	2361	637	697	2452	659	721	3522	708	809	3610	733	839
2183½	606	667	2270	632	693	2362	637	697	2453	659	721	3523	708	809	3611	733	839
2184	607	668	2271	632	693	2363	637	697	2454	660	722	3524	710	809	3612	733	
2185	607	668	2272	632	693	2364	637	697	2455	660	722	3525	710	809	3613	734	840
2186	607	668	2273	632	693	2365	637	697	2456	660	722	3526	709	808	3614	734	841
2187	607	668	2274	633	694	2366	637	697	2457	660	722	3527	709	806	3615	734	841
2188	608	666	2275	633	694	2367	637	697	2458	660	722	3528	709	808	3616	734	841
2189	602	663	2276	633	694	2368	637	697	2459	660	722	3529	710	809	3617	735	842
2190	602	663	2277	633	694	2369	637	697	2460	660	722	3530	711	810	3618	735	842
2191	602	663	2277½	633	694	2370	638	698	2461	664	726	3531	711	810	3619	736	841
2192	602	663	2278	633	694	2371	639	700	2462	662	724	3532	711	810	3620	736	843
2193	602	663	2279	633	694	2372	639	700	2463	662	724	3533	711	810	3621	736	843
2194	602	663	2280	622	672	2373	639	700	2464	662	724	3534	713	812	3622	736	843
2195	603	664	2281	623	683	2374	639	700	2465	662	724	3535	713	812	3623	737	843
2196	602	663	2282	623	683	2375	639	700	2466	662	724	3536	713	812	3624	737	844
2197	603	664	2283	623	683	2376	639	700	2467	662	724	3537	712	811	3625	737	846
2198	604	665	2284	623	683	2377	639	700	2468	661	723	3538	712	811	3626	737	847
2199	604	665	2285	623	683	2378	639	700	2469	661	723	3539	712	811	3627	738	846
			2286	624	684	2379	639	700	2470	661	723	3540	712	811	3628	738	846
2200	604	665	2287	624	684	2380	639	700	2471	663	725	3541	714	813	3629	738	846
2201	604	665	2288	624	684	2381	639	700	2472	663	725	3542	714	813	3630	739	847
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2203	604	665	2290	624	684	2383	640	701	2474	663	725	3544	715	814	3632	739	847
2204	604	665	2291	624	684	2384	640	701	2475	664	726	3545	715	814	3633	740	832
2205	604	665	2292	624	684	2385	640	701	2476	664	726	3546	715	814	3634	740	844
2206	604	665	2293	624	684	2386	640	701	2477	664	726	3547	715	814	3635	740	845
2207	605	662	2294	625	685	2387	640	701	2478	665	727	3548	716	815	3636	740	845
2208	605	662	2295	625	685	2388	640	701	2479	665	727	3549	716	815	3637	742	868
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2214	609	669	2303	628	688	2394	641	702	2485	666	728	3555	717	816	3643	741	867
2215	609	669	2304	628	688	2395	641	702	2486	667	729	3556	718	816	3644	748	875
2216	609	669	2305	628	688	2396	641	702	2487	667	729	3557	718	820	3645	748	875
2217	610	670	2306	628	688	2397	641	702	2488	667	729	3558	718	822	3646	749	876
2218	610	670	2307	626	686	2398	641	702	2489	667	729	3559	720	824	3647	749	876
2219	610	670	2308	626	686	2399	643	704	2490	667	729	3560	720	824	3648	749	876
2220	610	670	2309	626	686				2491	667	729	3561	719	820	3650	750	877
2221	610	670	2310	626	686	2400	643		2492	667	729	3562	719	817	3650½		877
2222	611	671	2311	626	686	2401	643	704	2493	668	730	3563	728	833	3651	745	874
2223	629	689	2312	626	686	2402	643	704	2494	668	730	3564	728	833	3651	750	877
2224	611	671	2313	627	687	2403	643	704	2495	668	730	3565	728	833	3652	745	874
2225	622	672	2314	627	687	2405	643		2496	668	730	3566	728	833	3652½		877
2226	622	672	2315	627	687	2406	643	704	2497	668	730	3567	728	833	3653	746	872
2227	622	672	2316	627	687	2407	643	704	2498	668	730	3568	723	827	3654	746	872
2228	622	672	2317	627	687	2408	642	703	2499	668	730	3569	723	827	3655	746	872
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3674	752	879	3695	757	884	3715	766	892	3736	771	858	3757	775	862	3778	780	895
3675	752	879	3696	757	884	3716	766	†891	3737	772	855	3758	775	862	3779	781	*
3676	752	879	3697	757	884	3717	766	†893	3738	772	*	3759	775	863			
3677	752	879	3698	760	†887	3718	766	†893	3739	772	855	3760	775	863	3780	781	895
3678	753	880	3699	759	886	3719	768	865	3740	747	873	3761	776	860	3781	781	894
3679	753	880				3720	767	892	3741	747	873	3762	776	860	3782	782	896
3680	753	880	3700	759	886	3721	767	891	3742	747	873	3763	776	860	3783	782	896
3681	753	880	3701	759	886	3722	767	892	3743	747	873	3764	776	860	3784	782	896
3682	754	881	3702	759	886	3723	767	892	3744	747	873	3765	777	859	3785	782	896
3683	754	*	3703	761	888	3724	768	852	3745	747	873	3766	777	859	3786	783	897
3684	754	881	3704	761	888	3725	768	852	3746	773	848	3767	777	859	3787	783	897
3685	754	881	3705	761	888	3726	769	850	3747	773	848	3768	778	856	3788	783	897
3686	755	882	3706	761	888	3727	769	850	3748	773	848	3769	778	856	3789	783	897
3687	755	882	3707	763	889	3728	769	†851	3749	773	849	3770	778	856	3790	784	898
3688	755	882	3708	764	890	3729	769	851	3750	773	849	3771	779	864	3791	784	898
3689	755	882	3709	764	890	3730	770	854	3751	774	861	3772	779	864	3792	784	898
3690	756	883	3710	764	890	3731	770	854	3752	774	861	3773	779	864	3793	744	871
3691	756	883	3711	764	890	3732	770	855	3753	774	*	3774	780	865	3794	744	871
3692	756	883	3712	765	891	3733	771	853	3754	774	†863	3775	779	†866	3795	744	871

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3815	43	3877	98	3984	141	3991	221	4049	332	5010	469	5071	800	5127	863
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3822	54	3879	101	3986	141	3993	225	4051	335	5012	484	5073	800	5129	866
3823	54	3880	100	3987	141	3994	231	4052	335	5013	485	5074	801	5130	866
3824	28	3881	100	3988	141	3995	231	4053	336	5014	497	5075	802	5131	877
3825	31	3882	100	3989	142	3996	234	4054	337	5015	499	5076	804	5132	891
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3828	63	3885	105	3942	153	3999	237	4057	338	5018	508	5079	809	5135	893
3829	63	3886	106	3943	155	4000	237	4058	341	5019	508	5080	812	5136	893
3830	63	3887	107	3944	155	4001	237	4059	302	5020	508	5081	815	5137	894
3831	64	3888	107	3945	158	4002	239	4060	327	5021	518	5082	816	5138	895
3832	64	3889	107	3946	157	4003	239	4061	253	5022	519	5083	819	5139	800
3833	68	3890	107	3947	159	4403½	241	4062	253	5023	540	5084	819	5140	807
3834	69	3891	107	3948	160	4004	242	4063	254	5024	540	5085	820	5141	813
3835	69	3892	108	3949	162	4005	242	4064	254	5025	540	5086	821	5142	462
3836	69	3893	108	3950	162	4006	242	4065	254	5026	529	5087	821	5143	48
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3839	71	3896	109	3953	162	4009	243	4068	351	5029	535	5090	822	5146	523
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3846	74	3903	124	3960	185	4016	252	4075	374	5036	546	5097	837	5153	526
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3849	75	3906	124	3963	185	4019	249	4078	379	5039	546	5100	839	5156	509
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3851	75	3908	125	3965	144	4021	255	4080	379	5041	546	5102	840	5158	586
3852	75	3909	125	3966	144	4022	256	4081	391	5042	546	5103	840	5159	817
3853	76	3910	131	3967	144	4023	256	4082	391	5043	546	5104	843	5160	817
3854	76	3910½	131	3968	182	4024	268	4083	391	5044	546	5105	844	5161	818
3855	76	3911	132	3969	182	4025	268	4084	391	5045	546	5106	844	5162	818
3856	76	3912	133	3970	182	4026	274	4085	391	5046	546	5107	845	5163	887
3857	76	3913	133	3971	183	4027	274	4086	465	5047	546	5108	845	5164	818
3858	83	3914	133	3972	183	4028	274	4087	465	5048	546	5109	848	5165	818
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3860	93	3916	134	3974	186	4030	302	4089	475	5050	546	5111	850	5167	818
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TAPER SHANK TWIST DRILLS

NO. 104—CARBON STEEL



NO. 500—HIGH SPEED STEEL

Continued from page 1.

FIG. 1

Diameter Inches	Decimal Equiv.	Price Each		Length Over All Inches	Standard Taper Shank	Diameter Inches	Decimal Equiv.	Price Each		Length Over All Inches	Standard Taper Shank
		Carbon Steel	High Speed					Carbon Steel	High Speed		
2 $\frac{1}{16}$	2.0156	\$19.25	\$36.25	16 $\frac{1}{2}$	No. 5.	2 $\frac{1}{16}$	2.5156	\$31.25	\$67.50	19 $\frac{1}{4}$	No. 5.
2 $\frac{1}{8}$	2.0312	19.25	36.25	16 $\frac{1}{2}$		2 $\frac{1}{8}$	2.5312	31.25	67.50	19 $\frac{1}{4}$	
2 $\frac{3}{16}$	2.0469	20.00	37.50	17		2 $\frac{3}{16}$	2.5469	32.00	70.00	19 $\frac{1}{4}$	
2 $\frac{1}{4}$	2.0625	20.00	37.50	17		2 $\frac{1}{4}$	2.5625	32.00	70.00	19 $\frac{1}{4}$	
2 $\frac{5}{16}$	2.0781	20.75	38.75	17		2 $\frac{5}{16}$	2.5781	33.00	72.50	19 $\frac{1}{2}$	
2 $\frac{3}{8}$	2.0937	20.75	38.75	17		2 $\frac{3}{8}$	2.5937	33.00	72.50	19 $\frac{1}{2}$	
2 $\frac{7}{16}$	2.1094	21.50	40.00	17		2 $\frac{7}{16}$	2.6094	34.00	75.00	19 $\frac{1}{2}$	
2 $\frac{1}{2}$	2.1250	21.50	40.00	17		2 $\frac{1}{2}$	2.6250	34.00	75.00	19 $\frac{1}{2}$	
2 $\frac{9}{16}$	2.1406	22.25	41.25	17		2 $\frac{9}{16}$	2.6406	35.00	77.50	20	
2 $\frac{5}{8}$	2.1562	22.25	41.25	17		2 $\frac{5}{8}$	2.6562	35.00	77.50	20	
2 $\frac{3}{4}$	2.1719	23.00	42.50	17		2 $\frac{3}{4}$	2.6719	36.00	80.00	20	
2 $\frac{7}{8}$	2.1875	23.00	42.50	17		2 $\frac{7}{8}$	2.6875	36.00	80.00	20	
2 $\frac{15}{16}$	2.2031	23.75	43.75	17 $\frac{1}{2}$		2 $\frac{15}{16}$	2.7031	37.00	82.50	20 $\frac{1}{4}$	
2 $\frac{1}{2}$	2.2187	23.75	43.75	17 $\frac{1}{2}$		2 $\frac{1}{2}$	2.7187	37.00	82.50	20 $\frac{1}{4}$	
2 $\frac{1}{4}$	2.2344	24.50	45.00	17 $\frac{1}{2}$		2 $\frac{1}{4}$	2.7344	38.00	85.00	20 $\frac{1}{4}$	
2 $\frac{1}{8}$	2.2500	24.50	45.00	17 $\frac{1}{2}$		2 $\frac{1}{8}$	2.7500	38.00	85.00	20 $\frac{1}{4}$	
2 $\frac{1}{16}$	2.2656	25.25	47.50	17 $\frac{1}{2}$		2 $\frac{1}{16}$	2.7656	39.25	87.50	20 $\frac{1}{4}$	
2 $\frac{1}{32}$	2.2812	25.25	47.50	17 $\frac{1}{2}$		2 $\frac{1}{32}$	2.7812	39.25	87.50	20 $\frac{1}{4}$	
2 $\frac{1}{64}$	2.2969	26.00	50.00	17 $\frac{1}{2}$		2 $\frac{1}{64}$	2.7969	40.50	90.00	20 $\frac{1}{4}$	
2 $\frac{1}{128}$	2.3125	26.00	50.00	17 $\frac{1}{2}$		2 $\frac{1}{128}$	2.8125	40.50	90.00	20 $\frac{1}{4}$	
2 $\frac{1}{256}$	2.3281	26.75	52.50	18		2 $\frac{1}{256}$	2.8281	41.75	92.50	21	
2 $\frac{1}{512}$	2.3437	26.75	52.50	18		2 $\frac{1}{512}$	2.8437	41.75	92.50	21	
2 $\frac{1}{1024}$	2.3594	27.50	55.00	18		2 $\frac{1}{1024}$	2.8594	43.00	95.00	21	
2 $\frac{1}{2048}$	2.3750	27.50	55.00	18		2 $\frac{1}{2048}$	2.8750	43.00	95.00	21	
2 $\frac{1}{4096}$	2.3906	28.25	57.50	18 $\frac{1}{2}$		2 $\frac{1}{4096}$	2.8906	44.25	97.50	21	
2 $\frac{1}{8192}$	2.4062	28.25	57.50	18 $\frac{1}{2}$		2 $\frac{1}{8192}$	2.9062	44.25	97.50	21	
2 $\frac{1}{16384}$	2.4219	29.00	60.00	18 $\frac{1}{2}$		2 $\frac{1}{16384}$	2.9219	45.50	100.00	21	
2 $\frac{1}{32768}$	2.4375	29.00	60.00	18 $\frac{1}{2}$		2 $\frac{1}{32768}$	2.9375	45.50	100.00	21	
2 $\frac{1}{65536}$	2.4531	29.75	62.50	19		2 $\frac{1}{65536}$	2.9531	46.75	102.50	22	
2 $\frac{1}{131072}$	2.4687	29.75	62.50	19		2 $\frac{1}{131072}$	2.9687	46.75	102.50	22	
2 $\frac{1}{262144}$	2.4844	30.50	65.00	19		2 $\frac{1}{262144}$	2.9844	48.00	105.00	22	
2 $\frac{1}{524288}$	2.5000	30.50	65.00	19		2 $\frac{1}{524288}$	3.0000	48.00	105.00	22	

32nd sizes not listed furnished at prices intermediate, and
64th sizes at price of next larger size.

Standard and Morse Taper the same.
Drills furnished with shanks grooved to fit Grip Sockets
without extra charge.

STANDARD TAPER SHANKS

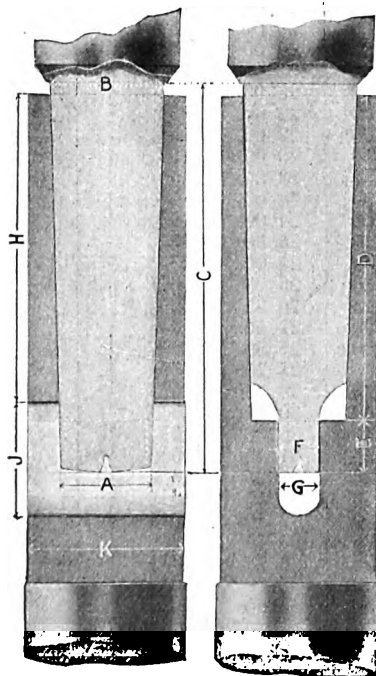


FIG. 2

Number of Taper	Diameter Small End of Shank	Diameter Large End of Shank	Total Length of Shank	Depth Hole in Socket	Length Tongue to End Socket Hole	Thi'kn's of Tongue
0	A	B	C	D	E	F
1	.2406	.3626	2 $\frac{1}{16}$	2 $\frac{1}{16}$	$\frac{1}{8}$	$\frac{1}{8}$
2	.3533	.4814	2 $\frac{1}{8}$	2 $\frac{1}{8}$	$\frac{1}{4}$	$\frac{1}{4}$
3	.5531	.7099	3 $\frac{1}{8}$	2 $\frac{3}{8}$	$\frac{3}{8}$	$\frac{3}{8}$
4	.7529	.9472	3 $\frac{7}{8}$	3 $\frac{1}{4}$	$\frac{1}{2}$	$\frac{1}{2}$
5	.9908	1.2438	4 $\frac{7}{8}$	4 $\frac{1}{4}$	$\frac{5}{8}$	$\frac{5}{8}$
6	1.4390	1.7605	6 $\frac{1}{8}$	5 $\frac{1}{4}$	$\frac{7}{8}$	$\frac{7}{8}$
7	2.0638	2.5104	8 $\frac{1}{8}$	7 $\frac{1}{4}$	1 $\frac{1}{8}$	1 $\frac{1}{8}$
	2.6849	3.2903	11 $\frac{1}{8}$	10 $\frac{1}{8}$	1 $\frac{1}{8}$	1 $\frac{1}{8}$
Number of Taper	Width of Keyway	End of Socket to Keyway	Length of Keyway	Diameter of Socket	Taper per foot	Taper per Inch
0	G	H	J	K	.625	.05208
1	$\frac{1}{16}$	2 $\frac{1}{16}$	$\frac{3}{4}$	$\frac{1}{8}$	.600	.05000
2	$\frac{1}{8}$	2 $\frac{1}{8}$	$\frac{1}{2}$	$\frac{1}{4}$	.602	.05016
3	$\frac{1}{4}$	3 $\frac{1}{4}$	1 $\frac{1}{8}$	$\frac{3}{8}$	.602	.05016
4	$\frac{3}{8}$	3 $\frac{3}{8}$	1 $\frac{1}{4}$	$\frac{1}{2}$	.623	.05191
5	$\frac{1}{2}$	4 $\frac{1}{2}$	1 $\frac{3}{4}$	2 $\frac{1}{4}$	.630	.05250
6	$\frac{3}{4}$	7	2 $\frac{1}{4}$	2 $\frac{3}{8}$	.626	.05216
7	1 $\frac{1}{8}$	9 $\frac{1}{2}$	2 $\frac{3}{4}$		.625	.05208

SPECIFY ALL TOOLS BY OUR LIST NUMBERS

TAPER SHANK TWIST DRILLS

WITH SHANKS LARGER THAN REGULAR

NO. 104½—CARBON STEEL



NO. 500A—HIGH SPEED STEEL

FIG. 3

Diameter Inches	Price Each		Length Over All Inches	Standard Taper Shank	Diameter Inches	Price Each		Length Over All Inches	Standard Taper Shank
	Carbon Steel	High Speed Steel				Carbon Steel	High Speed Steel		
1/16	\$1.40	\$2.80	6 1/2	No. 2	1/16	\$2.50	\$4.60	9 3/8	No. 3
1/8	1.40	2.80	6 3/4		1/8	2.50	4.60	9 3/8	
3/16	1.40	2.80	6 3/4		3/16	2.50	4.60	9 1/2	
1/4	1.40	2.80	7		1/4	2.50	4.60	9 1/2	
5/16	1.40	2.80	7		5/16	2.50	4.60	9 1/2	
3/8	1.40	2.80	7 1/4		3/8	2.50	4.60	9 5/8	
7/16	1.40	2.80	7 1/4		7/16	2.50	4.60	9 5/8	
1/2	1.40	2.80	7 1/2		1/2	2.50	4.60	9 5/8	
9/16	1.40	2.80	7 1/2		9/16	2.60	4.60	9 3/4	
5/8	1.40	2.80	7 3/4		5/8	2.60	4.60	9 3/4	
3/4	1.45	3.00	7 3/4		3/4	2.70	5.00	9 7/8	
7/8	1.45	3.00	7 3/4		7/8	2.70	5.00	9 7/8	
1	1.50	3.00	8		1	2.80	5.00	10	
1 1/8	1.50	3.00	8		1 1/8	2.80	5.00	10	
1 1/4	1.60	3.20	8 1/4		1 1/4	2.90	5.00	10 1/8	
1 1/2	1.60	3.20	8 1/4		1 1/2	2.90	5.00	10 1/8	
1 3/4	1.70	3.20	8 1/2		1 3/4	3.00	5.45	10 1/4	
2	1.70	3.20	8 3/2		2	3.00	5.45	10 1/4	

Larger Sizes on Application.

STRAIGHT SHANK TWIST DRILLS

TAPER LENGTH—LONG SERIES

NO. 104B—CARBON STEEL



NO. 501—HIGH SPEED STEEL

FIG. 4

Diameter Inches	Decimal Equiv.	Price Each		Length Over All Inches	Diameter Inches	Decimal Equiv.	Price Each		Length Over All Inches
		Carbon Steel	High Speed Steel				Carbon Steel	High Speed Steel	
1/16	.0625	\$0.45	\$0.90	3	1/16	.5625	\$1.40	\$2.25	8 1/4
1/8	.0781	.45	.90	3 3/4	1/8	.5781	1.50	2.40	8 1/2
3/16	.0937	.45	.90	4 1/4	3/16	.5937	1.50	2.40	8 1/2
1/4	.1093	.45	.90	4 5/8	1/4	.6094	1.60	2.50	8 3/4
5/16	.1250	.45	.90	5 1/2	5/16	.6250	1.60	2.50	8 3/4
3/8	.1406	.45	.90	5 5/8	3/8	.6406	1.70	2.75	9
7/16	.1562	.45	.90	5 5/8	7/16	.6562	1.70	2.75	9
1/2	.1719	.50	.90	5 5/4	1/2	.6719	1.80	3.00	9 1/4
9/16	.1875	.50	.90	5 5/4	9/16	.6875	1.80	3.00	9 1/4
5/8	.2031	.55	1.00	5 7/8	5/8	.7031	1.90	3.25	9 1/2
3/4	.2187	.55	1.00	6	3/4	.7187	1.90	3.25	9 1/2
7/8	.2344	.60	1.10	6 1/8	7/8	.7344	2.00	3.50	9 3/4
1	.2500	.60	1.10	6 1/8	1	.7500	2.00	3.50	9 3/4
1 1/8	.2656	.65	1.20	6 1/4	1 1/8	.7656	2.10	3.75	9 7/8
1 1/4	.2812	.65	1.20	6 3/4	1 1/4	.7812	2.10	3.75	9 7/8
1 1/2	.2969	.70	1.30	6 3/8	1 1/2	.7969	2.20	4.00	10
1 3/4	.3125	.70	1.30	6 3/8	1 3/4	.8125	2.20	4.00	10
2	.3281	.75	1.40	6 1/2	2	.8281	2.40	4.40	10 1/4
2 1/8	.3437	.75	1.40	6 1/2	2 1/8	.8437	2.40	4.40	10 1/4
2 1/4	.3594	.80	1.50	6 3/4	2 1/4	.8594	2.60	4.75	10 1/2
2 3/8	.3750	.80	1.50	6 3/4	2 3/8	.8750	2.60	4.75	10 1/2
2 1/2	.3906	.90	1.65	7	2 1/2	.8906	2.80	5.15	10 5/8
2 3/4	.4062	.90	1.65	7	2 3/4	.9062	2.80	5.15	10 5/8
3	.4219	1.00	1.75	7 1/4	3	.9219	3.00	5.50	10 3/4
3 1/8	.4375	1.00	1.75	7 1/4	3 1/8	.9375	3.00	5.50	10 3/4
3 1/4	.4531	1.10	1.90	7 1/2	3 1/4	.9531	3.25	5.90	10 3/4
3 3/8	.4687	1.10	1.90	7 1/2	3 3/8	.9687	3.25	5.90	10 3/4
3 1/2	.4844	1.20	2.00	7 3/4	3 1/2	.9844	3.50	6.25	11
3 3/4	.5000	1.20	2.00	7 3/4	3 3/4	1.0000	3.50	6.25	11
4	.5156	1.30	2.15	8	4	1.0156	3.75	6.75	11 1/8
4 1/8	.5312	1.30	2.15	8	4 1/8	1.0311	3.75	6.75	11 1/8
4 1/4	.5469	1.40	2.25	8 1/4	4 1/4	1.0469	4.00	7.25	11 1/4

SPECIFY ALL TOOLS BY OUR LIST NUMBERS

Continued on next page.

STRAIGHT SHANK TWIST DRILLS

TAPER LENGTH—LONG SERIES

NO. 104B—CARBON STEEL



NO. 501—HIGH SPEED STEEL

Continued from page 3.

FIG. 4

Diameter Inches	Decimal Equiv.	Price Each		Length Over All Inches	Diameter Inches	Decimal Equiv.	Price Each		Length Over All Inches
		Carbon Steel	High Speed Steel				Carbon Steel	High Speed Steel	
1 1/8	1.0625	\$4.00	\$ 7.25	11 1/4	1 1/8	1.5469	\$ 9.50	\$19.00	15 1/4
1 1/8	1.0781	4.25	7.75	11 1/2	1 1/8	1.5625	9.50	19.00	15 1/4
1 1/8	1.0937	4.25	7.75	11 1/2	1 1/8	1.5781	10.00	20.00	15 3/8
1 1/8	1.1094	4.50	8.25	11 3/4	1 1/8	1.5937	10.00	20.00	15 3/8
1 1/8	1.1250	4.50	8.25	11 3/4	1 1/8	1.6094	10.50	21.00	15 1/2
1 1/8	1.1406	4.75	8.90	11 7/8	1 1/8	1.6250	10.50	21.00	15 1/2
1 1/8	1.1562	4.75	8.90	11 7/8	1 1/8	1.6406	11.00	22.00	15 5/8
1 1/8	1.1719	5.00	9.50	12	1 1/8	1.6562	11.00	22.00	15 5/8
1 1/8	1.1875	5.00	9.50	12	1 1/8	1.6719	11.50	23.00	15 3/4
1 1/8	1.2031	5.25	10.15	12 1/8	1 1/8	1.6875	11.50	23.00	15 3/4
1 1/8	1.2187	5.25	10.15	12 1/8	1 1/8	1.7031	12.00	24.00	15 7/8
1 1/8	1.2344	5.50	10.75	12 1/2	1 1/8	1.7187	12.00	24.00	15 7/8
1 1/8	1.2500	5.50	10.75	12 1/2	1 1/8	1.7344	12.50	25.00	16
1 1/8	1.2656	5.75	11.50	14 1/8	1 1/8	1.7500	12.50	25.00	16
1 1/8	1.2812	5.75	11.50	14 1/8	1 1/8	1.7656	13.25	26.25	16 1/8
1 1/8	1.2969	6.00	12.25	14 1/4	1 1/8	1.7812	13.25	26.25	16 1/8
1 1/8	1.3125	6.00	12.25	14 1/4	1 1/8	1.7969	14.00	27.50	16 1/4
1 1/8	1.3281	6.25	13.00	14 3/8	1 1/8	1.8125	14.00	27.50	16 1/4
1 1/8	1.3437	6.25	13.00	14 3/8	1 1/8	1.8281	14.75	28.75	16 3/8
1 1/8	1.3594	6.50	13.75	14 1/2	1 1/8	1.8437	14.75	28.75	16 3/8
1 1/8	1.3750	6.50	13.75	14 1/2	1 1/8	1.8594	15.50	30.00	16 1/2
1 1/8	1.3906	7.00	14.65	14 5/8	1 1/8	1.8750	15.50	30.00	16 1/2
1 1/8	1.4062	7.00	14.65	14 5/8	1 1/8	1.8906	16.25	31.25	16 1/2
1 1/8	1.4219	7.50	15.50	14 3/4	1 1/8	1.9062	16.25	31.25	16 1/2
1 1/8	1.4375	7.50	15.50	14 3/4	1 1/8	1.9219	17.00	32.50	16 1/2
1 1/8	1.4531	8.00	16.40	14 7/8	1 1/8	1.9375	17.00	32.50	16 1/2
1 1/8	1.4687	8.00	16.40	14 7/8	1 1/8	1.9531	17.75	33.75	16 1/2
1 1/8	1.4844	8.50	17.25	15	1 1/8	1.9687	17.75	33.75	16 1/2
1 1/2	1.5000	8.50	17.25	15	1 1/2	1.9844	18.50	35.00	16 1/2
1 1/2	1.5156	9.00	18.15	15 1/8	2	2.0000	18.50	35.00	16 1/2
1 1/2	1.5312	9.00	18.15	15 1/8	...	.....	.....	.....	.....

JOBBER'S' STRAIGHT SHANK TWIST DRILLS

JOBBER'S' OR SHORT SERIES

NO. 105—CARBON STEEL



NO. 504—HIGH SPEED STEEL

FIG. 6

Diameter Inches	Decimal Equiv.	Price per Dozen		Length Over All Inches	Length Twist Inches	Diameter Inches	Decimal Equiv.	Price per Dozen		Length Over All Inches	Length Twist Inches
		Carbon Steel	High Speed					Carbon Steel	High Speed		
3/32	.0312	\$1.50	.....	1 1/2	5/8	3/32	.2812	\$ 3.80	\$ 9.10	4 1/4	2 3/4
3/32	.0469	1.55	.....	1 3/4	7/8	3/32	.2969	4.00	10.50	4 3/8	3 1/4
3/32	.0625	1.60	\$5.70	2 1/2	1 1/4	3/32	.3125	4.35	10.50	4 1/2	3 1/8
3/32	.0781	1.65	5.70	2 3/8	1 3/8	3/32	.3281	4.70	12.00	4 5/8	3 1/8
3/32	.0937	1.70	5.70	2 3/4	1 1/2	3/32	.3437	5.05	12.00	4 3/4	3 1/8
3/32	.1094	1.75	5.90	2 7/8	1 5/8	3/32	.3594	5.50	13.50	4 7/8	3 1/8
3/32	.1250	1.80	5.90	3	1 3/4	3/32	.3750	6.00	13.50	5	3 3/8
3/32	.1406	1.85	6.10	3 1/8	1 7/8	3/32	.3906	6.50	15.00	5 1/8	3 3/4
3/32	.1562	1.90	6.10	3 1/4	2	3/32	.4062	7.00	15.00	5 1/4	3 3/4
3/32	.1719	2.00	6.30	3 3/8	2 1/8	3/32	.4219	7.75	17.00	5 3/8	3 3/4
3/32	.1875	2.25	6.30	3 1/2	2 1/4	3/32	.4375	8.50	17.00	5 1/2	4 1/8
3/32	.2031	2.50	7.00	3 5/8	2 3/8	3/32	.4531	9.25	18.75	5 5/8	4 1/8
3/32	.2187	2.75	7.00	3 3/4	2 1/2	3/32	.4687	10.00	18.75	5 3/4	4 1/8
3/32	.2344	3.00	7.35	3 7/8	2 5/8	3/32	.4844	11.00	20.00	5 7/8	4 1/8
1/4	.2500	3.25	7.35	4	2 3/4	1/4	.5000	12.00	20.00	6	4 1/2
1/4	.2656	3.50	9.10	4 1/8	2 7/8	...	.....	.....	.....	...	...

SPECIFY ALL TOOLS BY OUR LIST NUMBERS

DRILLS— $\frac{1}{2}$ " SHANKS SHORT LENGTHS

FITTING BLACKSMITHS' DRILL PRESSES

NO. 112—CARBON STEEL

NO. 517—HIGH SPEED STEEL

FIG. 7

Diameter Inches	Price Each		Length Over all Inches	Length Twist Inches	Diameter Inches	Price Each		Length Over all Inches	Length Twist Inches
	Carbon Steel	High Speed Steel				Carbon Steel	High Speed Steel		
$\frac{1}{8}$	\$0.45	....	4 $\frac{7}{8}$	2 $\frac{3}{8}$	$\frac{1}{2}$	\$1.00	\$1.75	6	3
$\frac{1}{4}$	.45	....	5	2 $\frac{1}{2}$	$\frac{3}{4}$	1.05	1.90	6	3
$\frac{3}{8}$	.45	....	5 $\frac{1}{8}$	2 $\frac{1}{4}$	$\frac{1}{2}$	1.10	2.05	6	3
$\frac{1}{2}$	.50	....	5 $\frac{1}{4}$	2 $\frac{3}{8}$	$\frac{3}{4}$	1.20	2.20	6	3
$\frac{5}{8}$	.50	....	5 $\frac{1}{2}$	2 $\frac{1}{2}$	$\frac{1}{2}$	1.30	2.30	6	3
$\frac{3}{4}$	.55	....	5 $\frac{3}{8}$	2 $\frac{1}{2}$	$\frac{3}{4}$	1.40	2.40	6	3
$\frac{7}{8}$	.55	....	5 $\frac{1}{2}$	2 $\frac{1}{2}$	$\frac{1}{2}$	1.50	2.50	6	3
1	.60	....	5 $\frac{1}{8}$	3	$\frac{3}{4}$	1.60	2.65	6	3
$\frac{1}{8}$	.60	\$1.10	6	3	$\frac{1}{2}$	1.70	2.75	6	3
$\frac{1}{4}$	.65	1.20	6	3	$\frac{3}{4}$	1.80	2.90	6	3
$\frac{3}{8}$	.65	1.20	6	3	$\frac{1}{2}$	1.90	3.00	6	3
$\frac{1}{2}$	.70	1.30	6	3	$\frac{3}{4}$	2.00	3.15	6	3
$\frac{5}{8}$	.70	1.30	6	3	$\frac{1}{2}$	2.10	3.30	6	3
$\frac{3}{4}$	.75	1.40	6	3	$\frac{3}{4}$	2.20	3.50	6	3
$\frac{7}{8}$	.75	1.40	6	3	$\frac{1}{2}$	2.30	3.70	6	3
1	.80	1.45	6	3	$\frac{3}{4}$	2.40	3.90	6	3
$\frac{1}{8}$	.80	1.45	6	3	$\frac{1}{2}$	2.50	4.10	6	3
$\frac{1}{4}$	.85	1.55	6	3	$\frac{3}{4}$	2.70	4.50	6	3
$\frac{3}{8}$	.85	1.55	6	3	$\frac{1}{2}$	2.90	5.00	6	3
$\frac{1}{2}$	.90	1.60	6	3	$\frac{3}{4}$	3.10	5.50	6	3
$\frac{5}{8}$	.90	1.60	6	3	$\frac{1}{2}$	3.30	6.10	6	3
$\frac{3}{4}$	.95	1.70	6	3					
$\frac{7}{8}$	.95	1.70	6	3					
1	1.00	1.75	6	3					

We furnish the High Speed Drills with $\frac{1}{2}$ -inch shanks in sizes over $\frac{3}{4}$ -inch at customers' risk only.

COE'S DRILLS— $\frac{5}{8}$ " SHANKS—SHORT LENGTHS

FITTING BLACKSMITHS' DRILL PRESSES

NO. 110—CARBON STEEL

NO. 519—HIGH SPEED STEEL

FIG. 6

Diameter Inches	Price Each		Length Over All Inches	Length Twist Inches	Diameter Inches	Price Each		Length Over All Inches	Length Twist Inches
	Carbon Steel	High Speed Steel				Carbon Steel	High Speed Steel		
$\frac{1}{8}$	\$0.50	....	4 $\frac{7}{8}$	2 $\frac{3}{8}$	$\frac{5}{8}$	1.30	2.30	6	3
$\frac{1}{4}$	.55	....	5	2 $\frac{1}{2}$	$\frac{3}{4}$	\$1.40	\$2.40	6	3
$\frac{3}{8}$	.55	....	5 $\frac{1}{8}$	2 $\frac{1}{4}$	$\frac{1}{2}$	1.50	2.50	6	3
$\frac{1}{2}$	.60	....	5 $\frac{1}{4}$	2 $\frac{3}{8}$	$\frac{3}{4}$	1.60	2.65	6	3
$\frac{5}{8}$	.60	....	5 $\frac{1}{2}$	2 $\frac{1}{2}$	$\frac{1}{2}$	1.70	2.75	6	3
$\frac{3}{4}$	.65	....	5 $\frac{3}{8}$	2 $\frac{1}{2}$	$\frac{3}{4}$	1.80	2.90	6	3
$\frac{7}{8}$	.65	....	5 $\frac{1}{2}$	3	$\frac{1}{2}$	1.90	3.00	6	3
1	.70	....	5 $\frac{1}{8}$	3	$\frac{3}{4}$	2.00	3.15	6	3
$\frac{1}{8}$	.70	\$1.20	6	3	$\frac{1}{2}$	2.10	3.30	6	3
$\frac{1}{4}$	.75	1.30	6	3	$\frac{3}{4}$	2.20	3.50	6	3
$\frac{3}{8}$	.75	1.30	6	3	$\frac{1}{2}$	2.30	3.70	6	3
$\frac{1}{2}$	.80	1.40	6	3	$\frac{3}{4}$	2.40	3.90	6	3
$\frac{5}{8}$	.80	1.40	6	3	$\frac{1}{2}$	2.50	4.10	6	3
$\frac{3}{4}$	.85	1.50	6	3	$\frac{3}{4}$	2.60	4.30	6	3
$\frac{7}{8}$	.85	1.50	6	3	$\frac{1}{2}$	2.70	4.50	6	3
1	.90	1.55	6	3	$\frac{3}{4}$	2.80	4.75	6	3
$\frac{1}{8}$	.90	1.55	6	3	$\frac{1}{2}$	2.90	5.00	6	3
$\frac{1}{4}$	.95	1.65	6	3	$\frac{3}{4}$	3.00	5.25	6	3
$\frac{3}{8}$	.95	1.65	6	3	$\frac{1}{2}$	3.10	5.50	6	3
$\frac{1}{2}$	1.00	1.70	6	3	$\frac{3}{4}$	3.20	5.80	6	3
$\frac{5}{8}$	1.00	1.70	6	3	$\frac{1}{2}$	3.30	6.10	6	3
$\frac{3}{4}$	1.05	1.80	6	3	$\frac{3}{4}$	3.60	6.70	6	3
$\frac{7}{8}$	1.05	1.80	6	3	$\frac{1}{2}$	3.90	7.40	6	3
1	1.10	1.85	6	3	$\frac{3}{4}$	4.20	8.20	6	3
$\frac{1}{8}$	1.10	1.85	6	3	$\frac{1}{2}$	4.50	9.00	6	3
$\frac{1}{4}$	1.15	1.95	6	3					
$\frac{3}{8}$	1.20	2.05	6	3					
$\frac{1}{2}$	1.25	2.20	6	3					

High Speed Drills with $\frac{5}{8}$ -inch shanks in sizes over 1 inch furnished at customers' risk only.

STRAIGHT SHANK WIRE GAUGE DRILLS

NO. 107—CARBON STEEL

NO. 506—HIGH SPEED STEEL

FIG. 8

Numbers by Gauge	Decimal Equiv.	Price per Dozen		Length Over All Inches	Length Twist Inches	Numbers by Gauge	Decimal Equiv.	Price per Dozen		Length Over All Inches	Length Twist Inches
		Carbon Steel	High Speed					Carbon Steel	High Speed		
1	.2280	\$2.75	\$7.00	4	2 1/4	41	.0960	\$1.70	\$5.70	2 1/8	1 1/8
2	.2210	2.75	7.00	3 1/8	2 1/8	42	.0935	1.70	5.70	2 1/8	1 1/4
3	.2130	2.75	7.00	3 1/8	2 1/8	43	.0890	1.70	5.70	2 1/8	1 3/8
4	.2090	2.75	7.00	3 1/8	2 1/8	44	.0860	1.70	5.70	2 1/8	1 3/8
5	.2055	2.75	7.00	3 1/8	2 1/8	45	.0820	1.70	5.70	2 1/8	1 3/8
6	.2040	2.50	7.00	3 1/8	2 1/8	46	.0810	1.65	5.70	2 1/8	1 3/8
7	.2010	2.50	7.00	3 1/8	2 1/8	47	.0785	1.65	5.70	2 1/8	1 3/8
8	.1990	2.50	7.00	3 1/8	2 1/8	48	.0760	1.65	5.70	2 1/8	1 3/8
9	.1960	2.50	7.00	3 1/8	2 1/8	49	.0730	1.65	5.70	2	1
10	.1935	2.50	7.00	3 1/8	2 1/8	50	.0700	1.65	5.70	1 1/8	3/4
11	.1910	2.25	6.30	3 1/8	2 1/8	51	.0670	1.60	5.70	1 1/8	3/4
12	.1890	2.25	6.30	3 1/8	2 1/8	52	.0635	1.60	5.70	1 1/8	3/4
13	.1850	2.25	6.30	3 1/8	2 1/8	53	.0595	1.60	5.70	1 1/8	3/4
14	.1820	2.25	6.30	3 1/8	2 1/8	54	.0550	1.60	5.70	1 1/8	3/4
15	.1800	2.25	6.30	3 1/8	2 1/8	55	.0520	1.60	5.70	1 1/8	3/4
16	.1770	2.00	6.30	3 1/8	2 1/8	56	.0465	1.55	5.70	1 1/8	3/4
17	.1730	2.00	6.30	3 1/8	2 1/8	57	.0430	1.55	5.70	1 1/8	3/4
18	.1695	2.00	6.30	3 1/8	2 1/8	58	.0420	1.55	5.70	1 1/8	3/4
19	.1660	2.00	6.30	3 1/8	2 1/8	59	.0410	1.55	5.70	1 1/8	3/4
20	.1610	2.00	6.30	3 1/8	2 1/8	60	.0400	1.55	5.70	1 1/8	3/4
21	.1590	1.90	6.10	3 1/8	2 1/8	61	.0390	1.50	5.70	1 1/8	3/4
22	.1570	1.90	6.10	3 1/8	2 1/8	62	.0380	1.50	5.70	1 1/8	3/4
23	.1540	1.90	6.10	3 1/8	1 1/8	63	.0370	1.50	5.70	1 1/8	3/4
24	.1520	1.90	6.10	3 1/8	1 1/8	64	.0360	1.50	5.70	1 1/8	3/4
25	.1495	1.90	6.10	3	1 1/8	65	.0350	1.50	5.70	1 1/8	3/4
26	.1470	1.80	6.10	2 1/8	1 1/8	66	.0330	1.50	5.70	1 1/8	3/4
27	.1440	1.80	6.10	2 1/8	1 1/8	67	.0320	1.50	5.70	1 1/8	3/4
28	.1405	1.80	6.10	2 1/8	1 1/8	68	.0310	1.50	5.70	1 1/8	3/4
29	.1360	1.80	6.10	2 1/8	1 1/8	69	.0292	1.50	5.70	1 1/8	3/4
30	.1285	1.80	6.10	2 1/8	1 1/8	70	.0280	1.50	5.70	1 1/8	3/4
31	.1200	1.75	5.90	2 1/8	1 1/8	71	.0260	1.50	5.70	1 1/8	3/4
32	.1160	1.75	5.90	2 1/8	1 1/8	72	.0250	1.50	5.70	1 1/8	3/4
33	.1130	1.75	5.90	2 1/8	1 1/8	73	.0240	1.50	5.70	1 1/8	3/4
34	.1110	1.75	5.90	2 1/8	1 1/8	74	.0225	1.50	5.70	1 1/8	3/4
35	.1100	1.75	5.90	2 1/8	1 1/8	75	.0210	1.50	5.70	1 1/8	3/4
36	.1065	1.75	5.90	2 1/8	1 1/8	76	.0200	1.50	5.70	1 1/8	3/4
37	.1040	1.75	5.90	2 1/8	1 1/8	77	.0180	1.50	5.70	1 1/8	3/4
38	.1015	1.75	5.90	2 1/8	1 1/8	78	.0160	1.50	5.70	1 1/8	3/4
39	.0995	1.75	5.90	2 1/8	1 1/8	79	.0145	1.50	5.70	1 1/8	3/4
40	.0980	1.75	5.90	2 1/8	1 1/8	80	.0135	1.50	5.70	1 1/8	3/4

For very exact work specify Wire Gauge Drills by both number and decimal equivalent.

STRAIGHT SHANK TWIST DRILLS

LETTER SIZES

NO. 106—CARBON STEEL

NO. 505—HIGH SPEED STEEL

FIG. 9

Size	Decimal Equiv.	Price per Dozen		Length Over All Inches	Length Twist Inches	Size	Decimal Equiv.	Price per Dozen		Length Over All Inches	Length Twist Inches
		Carbon Steel	High Speed					Carbon Steel	High Speed		
A	.2340	\$3.00	\$7.35	3 1/8	2 1/8	N	.3020	\$4.25	\$10.50	4 1/4	3
B	.2380	3.05	7.35	3 1/8	2 1/8	O	.3160	4.40	10.50	4 1/4	3
C	.2420	3.10	7.35	3 1/8	2 1/8	P	.3230	4.60	12.00	4 3/8	3 1/8
D	.2460	3.15	7.35	3 1/8	2 1/8	Q	.3320	4.75	12.00	4 3/8	3 1/8
E	.2500	3.25	7.35	3 1/8	2 1/8	R	.3390	5.00	12.00	4 3/8	3 1/8
F	.2570	3.35	9.10	4 1/4	3	S	.3480	5.15	13.50	4 7/8	3 1/2
G	.2610	3.45	9.10	4 1/4	3	T	.3580	5.30	13.50	4 7/8	3 1/2
H	.2660	3.55	9.10	4 1/4	3	U	.3680	5.50	13.50	5	3 5/8
I	.2720	3.65	9.10	4 1/4	3	V	.3770	6.00	13.50	5	3 5/8
J	.2770	3.70	9.10	4 1/4	3	W	.3860	6.50	15.00	5 1/8	3 3/4
K	.2810	3.80	9.10	4 1/4	3	X	.3970	6.75	15.00	5 1/4	3 3/4
L	.2900	3.90	10.50	4 1/4	3	Y	.4040	7.00	15.00	5 1/4	3 3/4
M	.2950	4.00	10.50	4 1/4	3	Z	.4130	7.25	17.00	5 3/8	3 3/4

SPECIFY ALL TOOLS BY OUR LIST NUMBERS

CENTER DRILLS

FRACTIONAL SIZES

NO. 107C—CARBON STEEL



FIG. 11

Diameter Inches	Price per Dozen	Length Over All Inches	Length Twist Inches	Diameter Inches	Price per Dozen	Length Over All Inches	Length Twist Inches
1/16	\$1.50	1	1/2	1/16	\$2.50	1 1/2	1
1/8	1.55	1	1/2	1/8	2.75	1 1/2	1
3/16	1.60	1	1/2	3/16	3.00	1 1/2	1
1/4	1.65	1	1/2	1/4	3.25	1 1/2	1
5/16	1.70	1 1/4	3/4	WIRE GAUGE SIZES			
3/8	1.75	1 1/4	3/4	Numbers by Gauge	Price per Dozen	Length Over All Inches	Length Twist Inches
7/16	1.80	1 1/4	3/4				
1/2	1.85	1 1/4	3/4	30	\$1.80	1 1/4	3/4
9/16	1.90	1 1/2	1	40	1.75	1 1/4	3/4
5/8	2.00	1 1/2	1				
3/4	2.25	1 1/2	1				

RATCHET SHANK DRILLS

NOS. 1 AND 2 SHANKS



FIG. 13



FIG. 14

NO. 104A—CARBON STEEL

NO. 507—HIGH SPEED STEEL

NO. 104 1/2 A CARBON STEEL

NO. 508—HIGH SPEED STEEL

No. 1 Shank 5/8 inch x 3/8 inch x 1 1/2 inches long.

This size Shank always furnished unless otherwise specified.

No. 2 Shank 3/4 x 1/2 x 1 3/4 inches long.

This size Shank furnished only when specified.

Diameter Inches	Price Each		Length Over All Inches	Length Twist Inches No. 1 Shank	Length Twist Inches No. 2 Shank	Diameter Inches	Price Each		Length Over All Inches	Length Twist Inches No. 1 Shank	Length Twist Inches No. 2 Shank
	Carbon Steel	High Speed					Carbon Steel	High Speed			
1/16	\$0.90	\$2.30	4 1/2	2 3/8	2 1/8	1/16	\$1.90	\$4.20	7	4 3/4	4 1/2
1/8	.95	2.35	4 1/2	2 3/8	2 1/8	1/8	2.05	4.50	7 1/2	5 1/4	5
3/16	.95	2.40	4 1/2	2 3/8	2 1/8	3/16	2.20	4.70	7 1/2	5 1/4	5
1/4	1.00	2.45	5	2 3/4	2 1/2	1/4	2.30	5.00	8	5 1/2	5 1/2
5/16	1.00	2.50	5	2 3/4	2 1/2	5/16	2.40	5.25	8	5 1/2	5 1/2
3/8	1.05	2.55	5	2 3/4	2 1/2	3/8	2.55	5.50	8 1/2	6 1/4	5 1/8
7/16	1.10	2.60	5	2 3/4	2 1/2	7/16	2.70	5.75	8 1/2	6 1/4	5 1/8
1/2	1.15	2.65	5	2 3/4	2 1/2	1/2	2.85	6.00	9	6 1/2	6 1/4
9/16	1.20	2.70	6	3 3/4	3 1/2	9/16	3.00	6.30	9	6 1/2	6 1/4
5/8	1.25	2.75	6 1/4	4	3 5/8	5/8	3.10	6.70	9	6 1/2	6 1/4
3/4	1.25	2.80	6 1/4	4	3 5/8	3/4	3.25	7.00	9	6 1/2	6 1/4
7/8	1.30	2.85	6 1/4	4	3 5/8	7/8	3.35	7.30	9	6 1/2	6 1/4
1	1.30	2.90	6 1/2	4 3/8	4	1	3.50	7.60	9	6 1/2	6 1/4
1 1/16	1.35	2.95	6 1/2	4 3/8	4	1 1/16	3.65	7.90	9	6 1/2	6 1/4
1 1/8	1.35	3.00	6 1/2	4 3/8	4	1 1/8	3.75	8.25	9	6 1/2	6 1/4
1 1/4	1.40	3.10	6 1/2	4 3/8	4	1 1/4	3.90	8.60	9	6 1/2	6 1/4
1 1/2	1.40	3.20	6 1/2	4 3/8	4	1 1/2	4.05	9.00	9	6 1/2	6 1/4
1 3/4	1.45	3.30	6 1/2	4 3/8	4	1 3/4	4.20	9.40	9	6 1/2	6 1/4
1 7/8	1.45	3.40	6 1/2	4 3/8	4	1 7/8	4.35	9.80	9	6 1/2	6 1/4
2	1.50	3.50	6 1/2	4 3/8	4	2	4.50	10.20	9	6 1/2	6 1/4
2 1/16	1.55	3.65	6 1/2	4 3/8	4	2 1/16	4.65	10.60	9	6 1/2	6 1/4
2 1/8	1.65	3.80	6 3/4	4 1/2	4 3/8	2 1/8	4.80	11.00	9	6 1/2	6 1/4
2 1/4	1.75	4.00	7	4 1/2	4 1/2	2 1/4					

SPECIFY ALL SETS BY OUR LIST NUMBERS

BIT STOCK DRILLS

FOR METAL OR WOOD

NO. 108—CARBON STEEL



FIG. 12

Size of Shanks $\frac{1}{8}$ inch x $\frac{3}{8}$ inch x $1\frac{1}{4}$ inches long

Diameter Inches	Price Per Dozen	Length Over All Inches	Length Twist Inches	Diameter Inches	Price Per Dozen	Length Over All Inches	Length Twist Inches
$\frac{1}{8}$	\$2.50	$3\frac{1}{8}$	$1\frac{1}{4}$	$\frac{15}{16}$	\$11.75	$6\frac{1}{4}$	$4\frac{1}{4}$
$\frac{1}{4}$	2.60	$3\frac{1}{4}$	$1\frac{1}{8}$	$\frac{1}{2}$	13.00	7	$4\frac{5}{8}$
$\frac{3}{8}$	2.70	$3\frac{1}{2}$	$1\frac{1}{2}$	$\frac{5}{8}$	14.25	$7\frac{3}{8}$	5
$\frac{1}{2}$	2.85	$3\frac{3}{4}$	$1\frac{3}{4}$	$\frac{3}{4}$	15.50	$7\frac{5}{8}$	$5\frac{1}{8}$
$\frac{5}{8}$	3.00	$3\frac{7}{8}$	$1\frac{7}{8}$	$\frac{7}{8}$	16.75	$7\frac{7}{8}$	$5\frac{3}{8}$
$\frac{3}{4}$	3.25	$4\frac{1}{8}$	$2\frac{1}{8}$	$\frac{1}{2}$	18.00	8	$5\frac{5}{8}$
$\frac{7}{8}$	3.50	$4\frac{1}{4}$	$2\frac{1}{4}$	$\frac{1}{2}$	19.50	8	$5\frac{5}{8}$
$\frac{15}{16}$	3.75	$4\frac{3}{8}$	$2\frac{3}{8}$	$\frac{1}{2}$	21.00	8	$5\frac{5}{8}$
$1\frac{1}{8}$	4.00	$4\frac{1}{2}$	$2\frac{1}{2}$	$\frac{1}{2}$	22.50	8	$5\frac{5}{8}$
$1\frac{1}{4}$	4.25	$4\frac{3}{4}$	$2\frac{3}{4}$	$\frac{1}{2}$	24.00	8	$5\frac{5}{8}$
$1\frac{1}{2}$	4.50	$4\frac{7}{8}$	$2\frac{7}{8}$	$\frac{1}{2}$	25.50	8	$5\frac{5}{8}$
$1\frac{3}{4}$	4.75	5	$2\frac{3}{4}$	$\frac{1}{2}$	27.00	8	$5\frac{5}{8}$
$1\frac{7}{8}$	5.00	$5\frac{1}{8}$	$3\frac{1}{8}$	$\frac{1}{2}$	28.50	8	$5\frac{5}{8}$
$2\frac{1}{8}$	5.50	$5\frac{3}{8}$	$3\frac{1}{4}$	$\frac{1}{2}$	30.00	8	$5\frac{5}{8}$
$2\frac{1}{4}$	6.00	$5\frac{1}{2}$	$3\frac{3}{8}$	$\frac{1}{2}$	31.50	8	$5\frac{5}{8}$
$2\frac{1}{2}$	6.50	$5\frac{5}{8}$	$3\frac{1}{2}$	$\frac{1}{2}$	33.00	8	$5\frac{5}{8}$
$2\frac{3}{4}$	7.00	$5\frac{3}{4}$	$3\frac{5}{8}$	$\frac{1}{2}$	34.50	8	$5\frac{5}{8}$
$2\frac{7}{8}$	7.50	$5\frac{7}{8}$	$3\frac{3}{4}$	$\frac{1}{2}$	36.00	8	$5\frac{5}{8}$
$3\frac{1}{8}$	8.00	$5\frac{7}{8}$	$3\frac{1}{2}$	$\frac{1}{2}$	39.00	8	$5\frac{5}{8}$
$3\frac{1}{4}$	8.50	6	$3\frac{3}{4}$	$\frac{1}{2}$	42.00	8	$5\frac{5}{8}$
$3\frac{1}{2}$	9.25	$6\frac{1}{4}$	4	$\frac{1}{2}$	45.00	8	$5\frac{5}{8}$
$3\frac{3}{4}$	10.50	$6\frac{1}{2}$	$4\frac{1}{8}$	$\frac{1}{2}$	48.00	8	$5\frac{5}{8}$

These Bit Stock Drills will fit any brace on the market. They are intended principally for wood boring, but can be used to drill iron or other metals.

They are not injured by contact with screws or nails, and will bore straight any kind of wood without splitting it. Sizes larger than $\frac{1}{8}$ are made with solid shanks.

JEWELER'S DRILLS IN SETS

Set No. 10 Sizes No. 30 ($\frac{1}{8}$ inch) to No. 65 Wire Gauge, in a Mahogany Case with Cap (36 Drills)..... \$8.00

Mahogany Case without Drills..... 2.00



SET NO. 10—FIG. 17

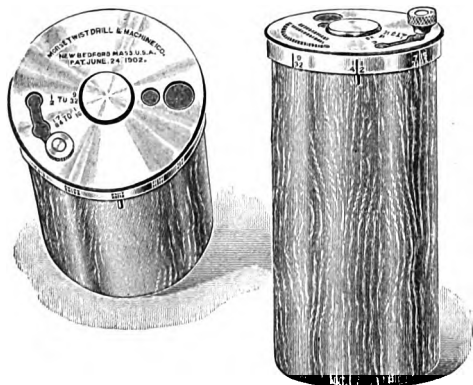
SETS OF DRILLS IN INDEXED CASES

FIG. 3800

The Drills in Patented Indexed Case, as illustrated, are contained in holes arranged in concentric circles in the block. Over them is a swinging cover with holes to match each circle. The swinging cover can be moved by the small knob shown so that its holes will register with the holes in the outer cover or cap. Around the edge of the cap are stamped the sizes of the various drills. The cap is turned to bring any size in line with an index mark and by inverting the case the selected drill will drop out.

INDEXED CASE CONTAINING :

No.	Complete with Drills	Without Drills
5A Set Straight Shank Twist Drills, $\frac{1}{8}$ to $\frac{1}{2}$ -inch by 64ths.....	\$15.00	\$2.50
6A Set Straight Shank Twist Drills, $\frac{1}{8}$ to $\frac{1}{2}$ -inch by 32ds.....	9.50	2.50
8A Set Wire Gauge Drills, from No. 1 to 60.....	14.00	2.50
9A Half Set Drills alternate numbers from No. 1 to 59.....	8.50	2.50

SETS OF DRILLS

MOUNTED ON MAPLE BLOCK WITH TAPER, STRAIGHT AND SQUARE SHANKS

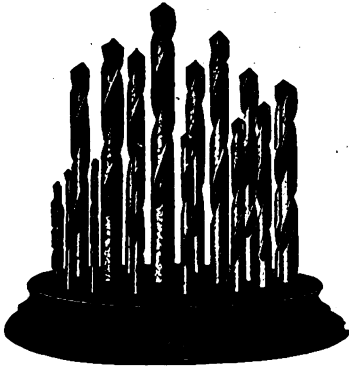


FIG. 15.

Drills of any size or length, made to order, and to fit any socket.

Grinding line is only applied to drills $\frac{3}{8}$ -inch diameter and larger.

Orders filled without grinding line, unless specified.

For very exact work, please give decimal equivalent.

Price per Set
Mounted Not
on Stand Mounted

No. 1	Taper shank drills $\frac{1}{4}$ to 1 inch by 16ths.....	\$22.40
No. 2	Taper shank drills $\frac{3}{8}$ to $1\frac{1}{4}$ inch by 16ths.....	40.10

		Price per Set Mounted Not on Stand Mounted	
No. 3	Taper shank drills $\frac{3}{8}$ to $\frac{1}{2}$ inch by 32nds and $1\frac{1}{8}$ to $1\frac{1}{4}$ inch by 16ths.	.....	\$48.50
No. 5A	Short set straight shank drills $\frac{1}{8}$ to $\frac{1}{2}$ inch by 64ths, mounted on maple blocks (block only, \$1.00).	\$13.50	12.50
No. 6	Short set straight shank drills $\frac{1}{8}$ to $\frac{1}{2}$ inch by 32nds, mounted on maple blocks (block only, \$1.00).	8.00	7.00
No. 7	Wire Gauge drills No. 1 to No. 60, short set straight shank drills $\frac{1}{4}$ to $\frac{3}{8}$ inch by 32nds, mounted on maple blocks (block only \$1.25)	14.50	13.25
No. 8A	Wire gauge drills No. 1 to No. 60, mounted on maple blocks (block only, \$1.25).....	12.50	11.25
No. 9	Wire gauge drills alternate Nos. from 1 to 59, mounted on maple blocks (block only, \$1.00).....	7.00	6.00
No. 15	Straight shank drills, letter size A to Z, mounted on maple blocks (blocks only, \$1.00).....	12.00	11.00
No. 13	Bit stock drills, $\frac{1}{8}$ to $\frac{1}{4}$ inch by 32ds.....	4.25	.....
	$\frac{1}{8}$ to $\frac{3}{8}$ inch by 16ths in screw top wooden boxes.....		

WIRE GAUGE AND JOBBERS' DRILLS IN SETS

Set No. 5. Sizes $\frac{1}{8}$ to $\frac{1}{2}$ inch, by 64ths, mounted on Metal Block..... \$15.00

Set No. 8. Sizes No. 1 to No. 60, mounted on Metal Block..... 13.25

Price of Metal Block only, \$2.40

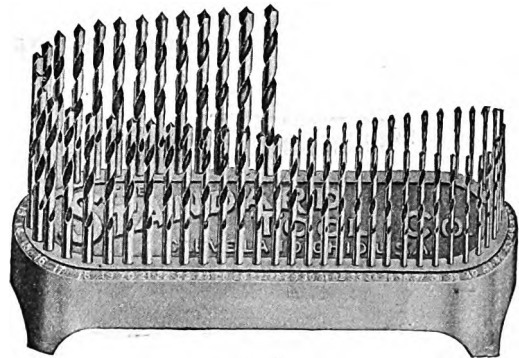


FIG. 16.

MORSE FOLDING OR PORTABLE DRILL HOLDERS

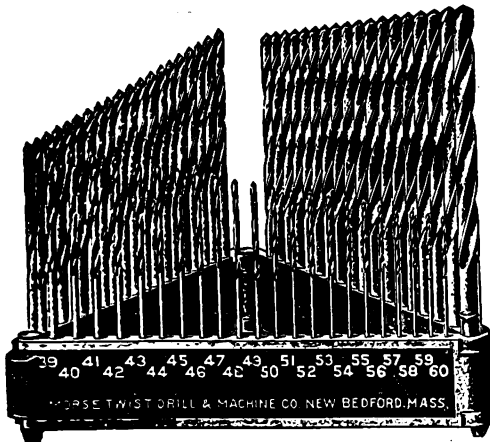


FIG. 18

		Per Set
No. 5B.	Set Drills, Straight Shanks, $\frac{1}{8}$ to $\frac{1}{2}$ inch by 64ths, Style No. 330. Less holder.....	\$12.50
No. 7B.	Set Drills from No. 60 to $\frac{3}{8}$ inch, Style Nos. 330 and 340. Less holder.....	13.25
No. 8B.	Set Drills, Wire Drill Gauge from No. 1 to 60, Style No. 340. Less holder.....	10.85
No. 15B.	Set Drills, Straight Shanks, A to Z, Style No. 332. Less holder.....	11.00
No. 18B.	Set Drills, Straight Shanks, 5 mm. to 6 mm. by $\frac{1}{16}$ mm., Style No. 333. Less holder.....	10.00
No. 19B.	Set Drills Straight Shanks, 1 mm. to 13 mm. by $\frac{1}{2}$ mm., Style No. 333. Less holder.....	11.00
Holders without Drills.....		2.50

DRIFTS OR CENTER KEYS

FOR SOCKETS AND SLEEVES



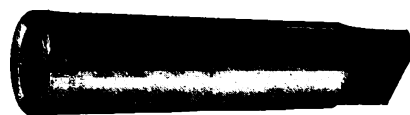
NO. 118A—FIG. 26

Size	Description	Price Each
No. 1.	Fitting No. 1 Sockets and Sleeves.....	\$0.45
" 2.	" " 2 " " " ".....	.50
" 3.	" " 3 " " " ".....	.55
" 4.	" " 4, 5 and 6 Sockets and Sleeves.....	.60

STEEL SLEEVES

FOR TAPER SHANK DRILLS

Size	Description	Price Each
1 to 2	No. 1 Hole—Outside Fitting No. 2 Socket	\$ 1.80
1 " 3	" 1 " " " 3 "	2.40
1 " 4	" 1 " " " 4 "	3.00
1 " 5	" 1 " " " 5 "	4.40
2 " 3	" 2 " " " 3 "	2.40
2 " 4	" 2 " " " 4 "	3.00
2 " 5	" 2 " " " 5 "	4.40
3 " 4	" 3 " " " 4 "	3.00
3 " 5	" 3 " " " 5 "	4.40
4 " 5	" 4 " " " 5 "	4.40
4 " 6	" 4 " " " 6 "	10.00
5 " 6	" 5 " " " 6 "	10.00

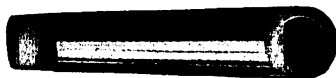


NO. 118—FIG. 22

In ordering from this list, specify, "Steel Sleeves."

"USE-EM-UP" DRILL SOCKETS

SOCKET TYPE—FIG. 19



SLEEVE TYPE—FIG. 20

To be used in connection with twist drills which have had the tangs twisted off. All that is necessary is to grind a flat on the remaining portion of the shank (time 3 minutes).

Use-Em-Up Drill Sockets are intended for using up twist drills or reamers having broken shanks or twisted tangs.

These sockets will drive a drill where only three-quarters of an inch of the shank remains. All that is necessary is to grind a flat surface on the remaining shank of the drill or reamer and put it to work.

When making boring bars, the expense of milling a tang is unnecessary; simply flat one side and use the Use-Em-Up Socket.

Size	Socket Type—Description	Price Each	Size	Sleeve Type—Description	Price Each
1 to 2	Has No. 1 Hole and No. 2 Shank.....	\$ 2.00	1 to 2	No. 1 Hole outside fits No. 2 Socket...	\$ 1.80
1 " 3	" " 1 " " " 3 ".....	2.50	1 " 3	" 1 " " " " 3 ".....	2.40
1 " 4	" " 1 " " " 4 ".....	3.20	1 " 4	" 1 " " " " 4 ".....	3.00
1 " 5	" " 1 " " " 5 ".....	4.80	1 " 5	" 1 " " " " 5 ".....	4.40
2 " 3	" " 2 " " " 3 ".....	2.50	2 " 3	" 2 " " " " 3 ".....	2.40
2 " 4	" " 2 " " " 4 ".....	3.20	2 " 4	" 2 " " " " 4 ".....	3.00
2 " 5	" " 2 " " " 5 ".....	4.80	2 " 5	" 2 " " " " 5 ".....	4.40
3 " 2	" " 3 " " " 2 ".....	3.20	3 " 4	" 3 " " " " 4 ".....	3.00
3 " 3	" " 3 " " " 3 ".....	3.20	3 " 5	" 3 " " " " 5 ".....	4.40
3 " 4	" " 3 " " " 4 ".....	3.20	4 " 5	" 4 " " " " 5 ".....	4.40
3 " 5	" " 3 " " " 5 ".....	4.80	4 " 6	" 4 " " " " 6 ".....	10.00
4 " 3	" " 4 " " " 3 ".....	4.80	5 " 6	" 5 " " " " 6 ".....	10.00
4 " 4	" " 4 " " " 4 ".....	4.80	.....	.....	.....
4 " 5	" " 4 " " " 5 ".....	4.80	.....	.....	.....
4 " 6	" " 4 " " " 6 ".....	12.00	.....	.....	.....
5 " 4	" " 5 " " " 4 ".....	12.00	.....	.....	.....
5 " 5	" " 5 " " " 5 ".....	12.00	.....	.....	.....
5 " 6	" " 5 " " " 6 ".....	12.00	.....	.....	.....

STEEL DRILL SOCKETS

BLACKSMITHS' WITH MORSE TAPER SHANK



FIG. 24

Taking Blacksmiths' Drills from $\frac{1}{8}$ to $1\frac{1}{2}$ inch with shanks $\frac{1}{4}$ inch or $\frac{5}{8}$ inch diameter. Made from bar steel.

No.	Size of Socket	Size of Shank	Price Each
02	$\frac{1}{4}$ inch diameter	No. 2 Morse Taper	\$1.50
03	$\frac{1}{2}$ " "	" 3 " "	1.75
003	$\frac{3}{8}$ " "	" 3 " "	1.75
04	$\frac{1}{2}$ " "	" 4 " "	2.00
004	$\frac{5}{8}$ " "	" 4 " "	2.00

SQUARE TAPER

WITH MORSE TAPER SHANK



FIG. 25

* Sizes given are the dimensions at small and large end of drill shank.

No.	Size of Shank	Takes Drills With Square Taper Shanks	Price Each
1	No. 1 Morse	Standard Bit Stock Shank.....	\$1.00
2	" 2 "	No. 1, Shank $\frac{3}{8}$ in. x $\frac{5}{8}$ in. Sq.*.	1.25
3	" 3 "	" 1, " $\frac{3}{8}$ " x $\frac{5}{8}$ " Sq....	1.50
4	" 4 "	" 2, " $\frac{1}{2}$ " x $\frac{3}{4}$ " "....	1.75
5	" 5 "	" 2, " $\frac{1}{2}$ " x $\frac{3}{4}$ " "....	2.50

FINISHED SHANKS FOR TAPER SHANK DRILLS



NO. 117—FIG 23

Size	Description	Price Each	Size	Description	Price Each
1 to 2	No. 1 Hole and No. 2 Shank.....	\$ 2.00	3 to 4	No. 3 Hole and No. 4 Shank.....	\$ 3.20
1 " 3	" 1 " " " 3 "	2.50	3 " 5	" 3 " " " 5 "	4.80
1 " 4	" 1 " " " 4 "	3.20	4 " 3	" 4 " " " 3 "	4.80
1 " 5	" 1 " " " 5 "	4.80	4 " 4	" 4 " " " 4 "	4.80
2 " 3	" 2 " " " 3 "	2.50	4 " 5	" 4 " " " 5 "	4.80
2 " 4	" 2 " " " 4 "	3.20	4 " 6	" 4 " " " 6 "	12.00
2 " 5	" 2 " " " 5 "	4.80	5 " 4	" 5 " " " 4 "	12.00
3 " 2	" 3 " " " 2 "	3.20	5 " 5	" 5 " " " 5 "	12.00
3 " 3	" 3 " " " 3 "	3.20	5 " 6	" 5 " " " 6 "	12.00

Always specify whether unfinished or finished Shanks are wanted.

UNFINISHED SHANKS FOR TAPER SHANK DRILLS

Shanks left rough to be fitted to machine.



NO. 116—FIG. 21

No.	Holds Drills Inclusive	Length Over All Inches	Diameter Shank Inches	Price Each
1	$\frac{1}{8}$ to $\frac{1}{4}$	6 $\frac{1}{4}$	$\frac{1}{4}$	\$ 1.20
2	$\frac{1}{4}$ " $\frac{3}{8}$	7 $\frac{1}{2}$	$\frac{1}{2}$	1.80
3	$\frac{3}{8}$ " $\frac{1}{2}$	9 $\frac{1}{4}$	$\frac{3}{8}$	2.50
4	$\frac{1}{2}$ " 2	11 $\frac{1}{8}$	$\frac{1}{2}$	4.00
5	2 $\frac{1}{4}$ " 3	15	2 $\frac{1}{2}$	7.50
6	3 $\frac{1}{4}$ " 6	18	3	14.00

RENSHAW RATCHET DRILLS

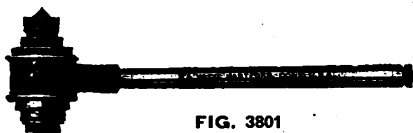


FIG. 3801

These tools are made in two sizes—No. 1 taking drills to $\frac{1}{2}$ -inch, No. 3 taking drills to $1\frac{1}{2}$ inches.

All the parts are made from steel and hardened.

No. 1 has one collet for drills, with shank $\frac{1}{4}$ -inch square at shoulder, and one collet for drills fitting No. 1 Morse's standard taper socket.

No. 3 has one collet, No. 5, for drills, with shank $\frac{1}{4}$ -inch square at shoulder, of $\frac{1}{2}$ to $1\frac{1}{2}$ inches diameter, which are the extreme sizes that this ratchet is adapted to carry, and collets Nos. 1, 2 and 3, for Morse's standard taper shanks. No. 3 and No. 5 collets are held in the spindle by screw thread. No. 1 and No. 2 collets are tapered externally to fit No. 3 socket.

	No. 1	No. 3
Length of handle overall, inches.....	9 $\frac{1}{2}$	18
Depth of top feed screw to bottom of collet, inches.....	3	5
Full depth of feed, inches.....	1 $\frac{1}{2}$	2 $\frac{3}{4}$

No. 1. Complete with two collets.....	\$11.00
No. 1. With one collet.....	9.40
No. 1. Collet with square or taper hole, each....	1.60
Can also furnish collets for No. 3 for Taper Square Shank Drills $\frac{5}{8}$ by $\frac{3}{8}$ by $1\frac{1}{2}$ inches long, also $\frac{3}{4}$ by $\frac{1}{2}$ by $1\frac{1}{4}$ inches long, suitable for drills listed on page 7.	
Price each.....	\$1.75

No. 3. Complete with four collets.....	\$15.00
No. 3. With No. 3 or No. 5 collet only.....	11.05
No. 3. With Nos. 1, 2 and 3 collets, only.....	13.25
No. 1 or No. 2 collet, for No. 3 Ratchet, each.....	1.10
No. 3 or No. 5 collet for No. 3 Ratchet, each.....	1.75

ARMSTRONG SHORT RATCHET DRILLS

FOR SQUARE TAPER SHANK DRILLS

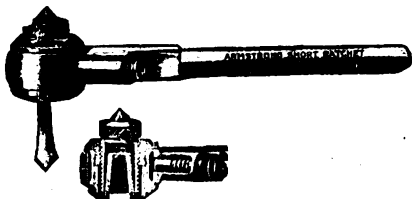


FIG. 28

No.	Socket Sq. Taper	Length Inches	Length Head Inches	Feed Inches	Price Each
2-A	No. 1	12	2 $\frac{3}{4}$	1 $\frac{1}{2}$	\$ 8.00
2-E	" 2	12	2 $\frac{3}{4}$	1 $\frac{1}{2}$	8.00
3-A	" 1	18	2 $\frac{3}{4}$	1 $\frac{1}{2}$	10.00
3-E	" 2	18	2 $\frac{3}{4}$	1 $\frac{1}{2}$	10.00

EXTRA SPINDLES

Spindle with Nut and Feed Screw, each..... \$3.50

NOTE—Style R Spindles for Morse Taper Shank Drills are interchangeable with styles A and E. By means of sockets listed on page 11, this ratchet can be adapted to use of blacksmiths' drills with round shank.

FOR MORSE TAPER SHANK DRILLS

SHORT HEAD

LONG FEED

REVERSIBLE

No.	Socket	Length Inches	Length Head Inches	Feed Inches	Price Each
2-R	No.3 Morse	12	3 $\frac{3}{4}$	2 $\frac{1}{2}$	\$8.00
3-R	" 3 "	18	3 $\frac{3}{4}$	2 $\frac{1}{2}$	10.00

EXTRA SPINDLES

Spindle with Nut and Feed Screw, each..... \$3.50

NOTE: Style A and E Spindles for Square Taper Shank Drills are interchangeable with Style R. By means of Sleeves and Sockets, listed on pages 10 and 11, Style R Spindle can be adapted to take smaller sizes of Morse Taper Shank Drills and Drills with Square Taper and Blacksmith's Shanks.

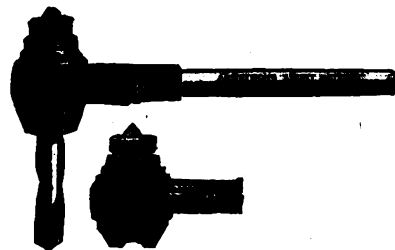


FIG. 29

ARMSTRONG RATCHET DRILLS

IMPROVED PACKER

No small screws; spindle bears on strong collar nut; extra strong teeth and pawl; large key and ample bearings. Have shorter head with full length feed. All steel hardened all over.



FIG. 31

SLEEVE RATCHETS WITH SQUARE TAPER SOCKET

No.	Length Inches	Size of Drill Socket	Length of Head Inches	Feed Inches	Price Each
1	10	No. 1 Square Taper*	6	2¼	\$4.75
2	12	" 1 " "	6¾	2½	6.00
3	15	" 1 " "	7¾	3	7.25
4	18	" 2 " "	9	3½	8.50
5	21	" 2 " "	9¾	4	10.25

*No. 1, or small drill socket is ⅜ inch square at small end and ⅝ inch square at large end.

†No. 2, or large drill socket is ½ inch square at small end and ¾ inch square at large end.

SLEEVE RATCHETS WITH MORSE TAPER SOCKET

No.	Length Inches	Size of Drill Socket	Takes Morse Taper Drills Inches	Length of Head Inches	Feed Inches	Price Each
1-M	10	No. 2 Morse	⅜ to ⅜	6	2¼	\$5.75
2-M	12	" 3 "	⅜ " 1¼	6¾	2½	7.25
3-M	15	" 3 "	⅜ " 1¼	7¾	3	9.00
4-M	18	" 4 "	1½ " 2	9	3½	11.25
5-M	21	" 4 "	1½ " 2	9¾	4	13.50
6-M	30	" 5 "	2½ " 3	12½	4½	35.00

By means of Sleeves and Sockets Packer Ratchets can be adapted to take drills of smaller size and different form of shank.

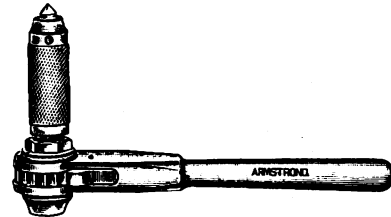


FIG. 33

BOILER

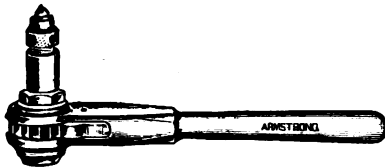


FIG. 34

No.	Length	Size of Drill Socket	Length of Head	Feed	Price Each
1-B	10 in.	No. 1 Square Taper*	4⅝ in.	1½ in.	\$ 4.00
2-B	12 "	" 1 " "	5 "	1¾ "	4.75
3-B	15 "	" 1 " "	5½ "	2 "	7.25
4-B	18 "	" 2 " "	6 "	2¼ "	8.50
5-B	21 "	" 2 " "	6½ "	2½ "	10.25

*No. 1, or small drill socket is ⅜ inch square at small end and ⅝ inch square at large end.

†No. 2, or large drill socket is ½ inch square at small end and ¾ inch square at large end.

UNIVERSAL

Designed to operate successfully in difficult situations where obstructions might make the use of the ordinary ratchet impossible, and at the same time provision is made for its operation in the usual way, so that it may perform the work of a plain ratchet as well as the special service for which it is particularly adapted. The construction of the tool in every respect is good and substantial.

Pawls and center are tool steel hardened, all other parts (except handle of tubing) are made of steel drop-forged, or machined from bar.

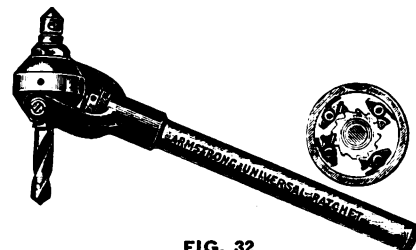


FIG. 32

SPINDLES FURNISHED

No.	Length Inches	Feed Inches	Complete with One Spindle Only	Extra Spindles Each
4	14	1½	\$12.00	\$2.40
5	16	1¾	15.00	3.00
6	18	2¼	18.00	3.60

Style	Fitting Ratchet	Taking Drills
M	No. 4	With No. 1 Square Taper Shanks
K	" 4	" " 2 Morse " "
J	" 5	" " 1 " " "
L	" 5	" " 2 " " "
O	" 5	" " 3 " " "
F	" 6	" " 2 Square " "
N	" 6	" " 3 Morse " "
S	" 6	" " 4 " " "

ARMSTRONG DRILLING POST

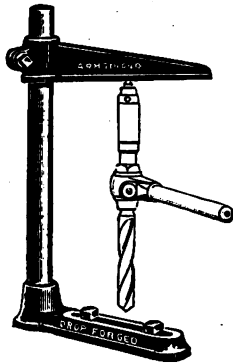


FIG. 27

(OLD MAN)

FOR USE WITH RATCHET DRILLS—DROP FORGED STEEL

Foot and Arm are Drop Forged. The finished steel post is screwed into foot and can be easily removed for packing in tool kit. Each Drilling Post is boxed separately.

No.	Height of Post Inches	Diameter of Post Inches	Arm Radius Inches	Weight Each Pounds	Price Each
8	16	1	8	9	\$5.00
10	20	1 1/4	10	16	6.00
12	26	1 1/2	12	30	7.50

CHAIN DRILLS GOODSELL-PRATT

AUTOMATIC CHAIN DRILL NO. 326
FOR ROUND SHANK DRILLS
CAPACITY 0 TO 1/2 INCH

Equipped with new Automatic Feed Device, which saves both time and breakage. The feed does not operate until the Drill actually engages with the work; this enables the operator to run the Drill rapidly down to the work and, when it is completed, to back out just as fast as he can turn the Spindle. In other styles of feeds, one can only back out as fast as the feed operates, or else the operator is obliged to turn the feed screw back with his fingers.

Another important feature of this Automatic Feed is its adjustment. The amount of feed is governed by the Knurled Nut visible on the front of the Frame. This Nut is marked with different Drill sizes, which are turned to come opposite a fair mark on the Frame.

The squared end of the steel Spindle, which also forms the Feed Screw, is case hardened to prevent its being damaged. The Spindle runs in ball bearings which reduce the end thrust.



FIG. 35

Each Drill is equipped with three feet of strong steel chain. Special lengths can be furnished to order.

The Chuck is all steel, with three hardened jaws for holding Round Shank Drills of all sizes from 0 to 1/2 inch.

Weight, 3 1/2 pounds..... Price each \$5.30

CHAIN DRILL NO. 0316
WITH HAND FEED FOR ROUND SHANK DRILLS
CAPACITY 0 TO 1/2 INCH

Many mechanics prefer a Chain Drill with a plain Screw Feed, as they can absolutely control the pressure upon their Twist Drill at all times. The Hand Feed is also much simpler to manufacture and Drills so equipped can be sold at lower prices.

The Feed on this tool is very easily controlled by the large Knurled Ring on the Feed Screw.

The Spindle, which also forms the Feed Screw, has a hardened end to prevent its being damaged. It runs in ball bearings which reduce the end thrust.

Each Drill is equipped with three feet of strong steel chain. Special lengths can be furnished to order.

The iron Frame is black enameled, and the Chuck Shell is polished and nickel plated.

The Chuck is all steel, with three hardened jaws for holding Round Shank Drill of all sizes from 0 to 1/2 inch.

Length of tool 9 inches.

Weight 2 3/4 pounds..... Price each \$3.60



FIG. 36

"YANKEE"

Its distinguishing feature is its convenience and rapidity of operation, and automatic friction and ratchet feed. The taking up and releasing of Chain is done in a moment with a friction feed, by simply turning brace or Breast Drill by which Chain Drill is operated. When the Chain is tight, the automatic feed operates by turning of small lever to horizontal position. When Drill has reached desired depth the automatic feed is thrown off by turning lever to upright position. Reverse movement of Brace and Drill is withdrawn, Chain slackened in a moment.

The automatic feed is positive, fixed and without adjustment for Drills up to 1/2 inch, so that Drills cannot be broken in use. There is no hand feed, nor any parts to fuss over, and nothing to catch or pinch the fingers in use.

No. 500. 2-Jaw Chuck, weight 3 1/2 lbs. Price each..... \$4.00

No. 1500. 3-Jaw Chuck, weight 3 1/2 lbs. Price each..... 4.00

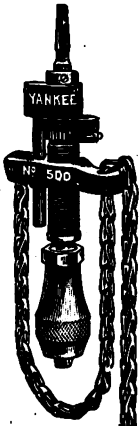


FIG. 3802

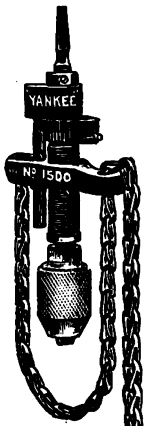
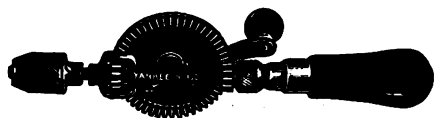
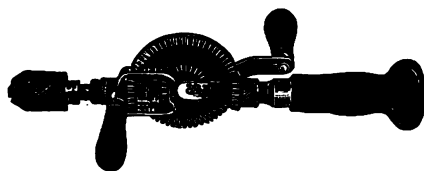


FIG. 3803

HAND DRILLS**"YANKEE" PLAIN****DOUBLE GEARED****SINGLE SPEED NO. 1430—TWO SPEEDS NO. 1445****NO. 1430—FIG. 3804****NO. 1445—FIG. 3805**

Very quick and easy change in speed can be made by the small shifter on main frame between small gears. With shifter at top notch S, it is set for slow speed, at bottom notch F, fast speed, in center notch L, the spindle is locked so the chuck can be readily opened or closed.

They are strong and substantially built for hard work and durability, have adjustable ball bearings on spindle to take up all strain or wear. They are made with either two or three jaw chucks. The frames are of malleable iron, spindle of steel turned and fitted, all gears have teeth cut from the solid, to run smoothly and accurately, and of extra strength. The drills are finished in dead black color, with bright parts polished.

These drills have detachable handles with magazine for drills.

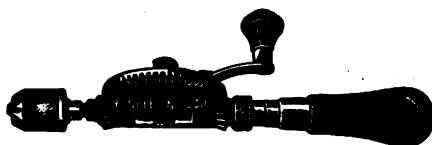
No. 1430	Single Speed Three-Jaw Chuck holding up to $\frac{1}{4}$ -inch, length 10½ inches, weight 1¼ lbs.	
	Price each.....	\$3.50
No. 1445	Two Speed Three-Jaw Chuck holding up to $\frac{3}{8}$ -inch, length 15 inches, weight 3½ lbs.	
	Price each.....	6.20

"YANKEE" RATCHET**DOUBLE GEARED**

Differs from all others in what it will do and how it does it

Note the little slide on Cylinder between Gears and the notches. With slide in first notch (at top), it is a Plain Drill, in second a Left-hand Ratchet, in third a Right-hand Ratchet, in fourth a Double Ratchet where any movement of Crank forward or backward causes the Drill to cut continuously, a time saver and convenience when working in corners where Crank cannot be turned. In fifth (at bottom) Gearing, etc., is locked to open or close Chuck.

In double speed styles the change of speed, fast or slow, is made by simple movement of lever on Hub or Gear, and without removing Drill from work, and with any of the movements named above.

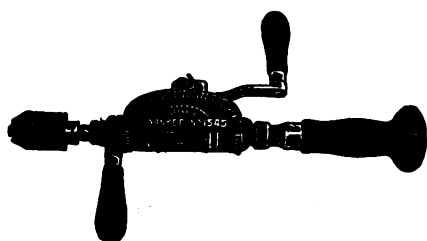
SINGLE SPEED NO. 1530**NO. 1530—FIG. 50**

The Frame is malleable iron, finished in dead black color. The Chuck body is steel, polished and nickel-plated. The Jaws are of steel, drop forged and hardened. The Spindle of steel and Gears are cast iron with cut teeth. The Driving Gear is 3 inches diameter and Driven Gears on spindle $\frac{1}{8}$ inch diameter.

The thrust on spindle is taken by hardened steel bearing in lower end of frame, and so arranged that any wear can be readily taken up.

The Wood Handle with ferrule is 4 inches long, large end 1½ inches diameter, and can be detached from frame by the milled nut, and thus use interior of handle as a magazine for drills.

No. 1530	Single Speed Three-Jaw Chuck holding up to $\frac{1}{4}$ -inch, length 10½ inches, weight 1¼ lbs.	Price each.....	\$4.60
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TWO SPEEDS NO. 1545**NO. 1545—FIG. 49**

Adjustable Ball Bearings, Malleable Iron Frame, Steel Spindle, Cut Gears. Large gear 4½ inches, small gear 1½ inches diameter. Wood handle is 4½ inches long, 2½ inches diameter, and can be detached from frame by milled nut to use interior of handle as a magazine for drills. Finished in dull black, bright parts nickel-plated and polished.

No. 1545	Two Speeds Three-Jaw Chuck holding up to $\frac{3}{8}$ -inch, length 16 inches, weight 4¼ lbs.	Price each.....	\$8.20
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HAND DRILLS

MILLER FALLS

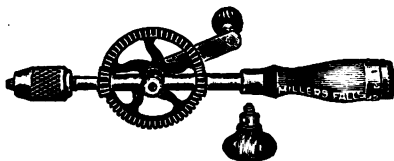
SINGLE SPEED—SINGLE GEARED NO. 2B



NO. 2-B—FIG. 39

Stained hardwood; malleable iron, black enameled frame; large gear painted red; other metal parts nickeled. Solid end handle shaped so tool may be used as a breast drill. Removable side, grip handle. Cut gears with adjustable friction roll to equalize bearings. Pinion of steel; ball thrust bearing. Chuck of Star pattern with 3 jaws opening with springs and closing evenly on, and centering accurately, round shanks from 0 to $\frac{3}{8}$ inch in diameter. Length $14\frac{1}{2}$ inches. Weight, (with pasteboard box) 2 pounds. Price, each..... \$4.55

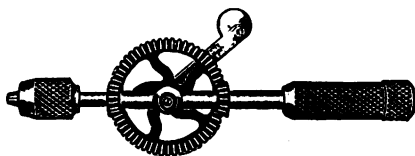
SINGLE SPEED—DOUBLE GEARED NO. 307



NO. 307—FIG. 41

Stained hardwood handles. Main frame is of steel handsomely nickeled and idler pinion is provided to counteract the outward thrust of large gear. Main handle containing 8 wood boring points, each point in a separate cell and released by a screw cap without disturbing the others. Pinions of steel. Three-jawed chuck of the Star pattern with jaws opening evenly by means of springs that are protected from injury and will not get out of order. Chuck holds and centers accurately round shanks from 0 to $\frac{1}{4}$ inch in diameter. Length $12\frac{3}{4}$ inches. Weight, (with pasteboard box) $1\frac{1}{2}$ pounds. Price, each, including 8 fluted drill points. \$4.25
Price, per set. of 8 fluted drill points..... .50

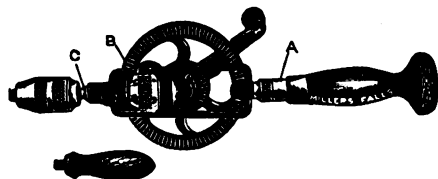
SINGLE SPEED—DOUBLE GEARED NO 343



NO. 343—FIG. 42

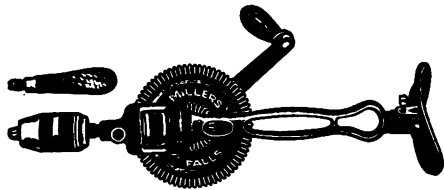
All metal, except enameled hardwood crank handle; solid steel frame, nickeled; large gear enameled black, with red stripe. Hollow end handle, handsomely knurled, with removable screw cap. Cut gears, pinions of steel. Three-jawed chuck holding round shanks from 0 to $\frac{1}{8}$ inch in diameter. Not provided with ratchet; large gear is of open construction. Length 11 inches. Weight, (with pasteboard box) $1\frac{1}{2}$ pounds. Price, each..... \$3.70

TWO SPEEDS—DOUBLE GEARED NO. 980

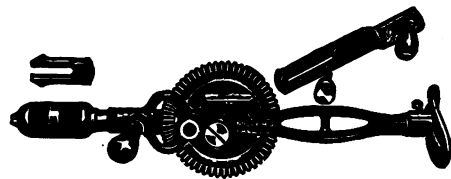


NO. 980—FIG. 43

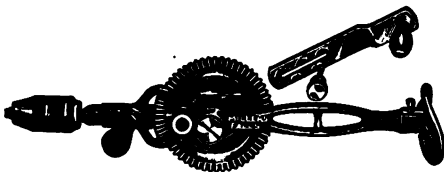
Hollow end handle of shapely design with mushroom head. Choice stained hardwood handles; malleable iron frame; large gear painted red; other parts nickeled. Hollow end handle with receptacle for holding twist drills, detached by loosening a knurled check nut and pressing on the plunger at A shown in illustration, and shaped so tool may be used as a breast drill. Removable side, grip handle. Instantly changeable speed, $1\frac{1}{2}$ to 1 and 4 to 1, operated by shifting knurled ring B. Pinions and shifting device of steel and enclosed for protection. Cut gears with adjustable friction roll to equalize bearings. Ball thrust bearing at point marked C in illustration. Chuck of Star pattern with three jaws opening with springs, which are protected from injury and will not get out of order, and closing evenly on, and centering accurately, round shanks from 0 to $\frac{3}{8}$ inch in diameter. Length, without handle, 10 inches; with handle, $15\frac{1}{4}$ inches. Weight, (with pasteboard box) 3 pounds. Price, each..... \$6.15

BREAST DRILLS**MILLERS FALLS**

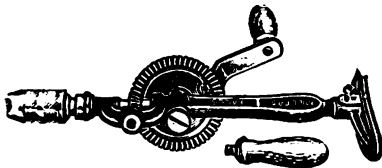
NO. 2100—FIG. 51



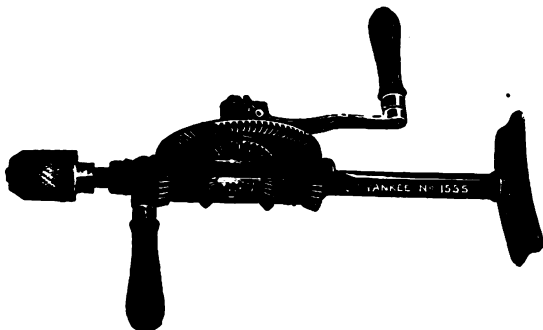
NO. 12—FIG. 3806



NO. 118—FIG. 54



NO. 212—FIG. 55



NO. 1555—FIG. 48

TWO SPEEDS—DOUBLE GEARED NO. 2100

Selected hardwood handles, stained; malleable iron, black frame; large gear, red. Breast plate and crank enameled black; no nickeled parts. Breast plate adjustable to different positions. Instantly changeable speed from $1\frac{1}{2}$ to 1 and 4 to 1. Cut gears; small gears of steel. Auxiliary side handle. Chuck of Star pattern with three jaws operated by springs that are protected from injury and will not get out of order; holds round shanks from 0 to $\frac{1}{2}$ inch in diameter. Weight (with pasteboard box), $5\frac{1}{2}$ pounds. Length, $17\frac{1}{2}$ inches. Price, each..... \$6.90

TWO SPEEDS—SINGLE GEARED NO. 12

The speed is changed by removing set screw and shifting large gear to alternate position. The gear ratios are even and 3 to 1. Both gears are cut, the pinion being of steel, and there is an idler roll to equalize the bearing. An important feature of this tool is the double ball thrust bearing. There are two sets of ball bearings which render it a very free running tool, and one that will be long to show signs of wear. Besides, there is a take-up nut to provide for wear at the bearings. Has an extensible crank with radius from 4 to 6 inches, giving added power to the tool. The breastplate is also adjustable to different positions. The patent level attachment is a serviceable feature. Stained hardwood handles; large gear painted green, breastplate and malleable iron main stock enameled black; chuck and crank nickeled. Equipped with a Master chuck with patent jaws which take bitstock shanks, round shanks from $\frac{1}{8}$ to $\frac{1}{2}$ inch, and No. 1 Morse taper shanks. Length $17\frac{1}{2}$ inches. Weight $6\frac{1}{2}$ pounds. Price each (packed one in a pasteboard box)..... \$4.50

TWO SPEEDS—SINGLE GEARED NO. 118

Stained hardwood handles; large gear painted green and breast plate and malleable iron main stock enameled black; chuck and crank nickeled. Breast plate adjustable to different positions and removable. Patent level attachment. Cut gears large gear with idler roll to equalize bearings. Pinion of steel. Ball thrust bearing. Extensible crank with radius from 4 to 6 inches, adding power to the tool. Changeable speed from even to 3 to 1. Chuck is of the Star pattern with three jaws, made especially for holding round shanks from 0 to $\frac{1}{2}$ inch in diameter. Jaws are operated by springs that are protected from injury and will not get out of order. Length, $17\frac{1}{2}$ inches. Weight, (with pasteboard box), $6\frac{1}{2}$ pounds. Price, each..... \$7.65

SINGLE SPEED—SINGLE GEARED NO. 212

Stained, hardwood handles; malleable iron frame painted dull black; large gear and under side of breast plate painted red; crank black oxidized ("Nox") finish; chuck polished. Breast plate adjustable to different positions and removable. Cut gears; small gears of steel; ratio $3\frac{1}{2}$ to 1; diameter of large gear 4 inches. Radius of crank, 4 inches. Hardened steel washer at thrust bearing. Star chuck with large jaws, holding and centering accurately round shanks from 0 to $\frac{3}{8}$ inch in diameter. The jaws in this chuck are operated by springs that are protected from injury and will not get out of order. Length, $14\frac{1}{2}$ inches. Weight (with pasteboard box), $3\frac{1}{2}$ pounds. Price, each.. \$4.60

"YANKEE"**TWO SPEEDS—DOUBLE GEARED NO. 1555**

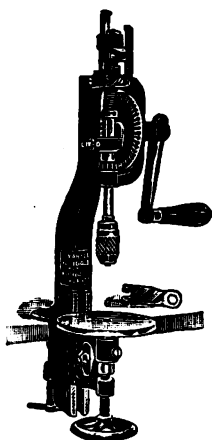
With right and left hand and continuous ratchet movement, dead black finish, bright parts nickel plated and polished. Same general construction as hand drill No. 1545, page 15.

Malleable iron frame, cut gears, large gear $5\frac{1}{4}$ in.. small gear $1\frac{1}{8}$ in. diameter, steel spindle, adjustable ball bearings.

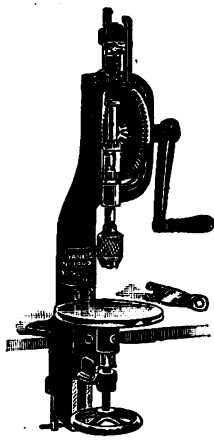
Three jaw chuck holding up to $\frac{1}{2}$ inch. Length 17 inches. Weight $6\frac{3}{4}$ pounds. Price each..... \$10.25

BENCH DRILLS

YANKEE



NO. 1003—FIG. 58



NO. 1005—FIG. 59

AUTOMATIC FRICTION AND RATCHET FEEDS, CYLINDRICAL COLUMN, ADJUSTABLE BRACKET FOR TABLE, ADJUSTABLE REMOVABLE TABLE AND BRACKET, DEAD BLACK COLOR FRAME.

SINGLE SPEED NO. 1003

One speed only (geared 49 to 14), one turn of crank gives $3\frac{1}{2}$ revolutions to spindle, cut gears, $\frac{3}{8}$ in. steel spindle, three-Jaw polished and nickel plated tool steel chuck, $1\frac{3}{4}$ in. long, 1 in. diameter, holds Round Shank Drills up to $\frac{1}{4}$ in. Diameter inclusive, $1\frac{1}{2}$ in. traverse of spindle (automatic feed), Ball Bearing V thread feed screw, hardened steel wearing parts. Weight each boxed about 20 pound. Price, each..... \$15.00

The crank is 4 in. between centers. The bracket at base of column has a vertical adjustment of $2\frac{3}{4}$ in., the slide being $5\frac{3}{4}$ in., and bracket 3 in. long. The table on bracket has an independent movement of $1\frac{1}{4}$ in. by means of a 3 in. Hand Wheel and

Screw, and can be used for feeding in emergencies, in addition to automatic feed. The table is $4\frac{1}{4}$ in. diameter, its center $2\frac{3}{4}$ in. from face of slide. The lower end of bracket slide on column is $4\frac{1}{4}$ in. below base resting on bench; from bench the top of column is $11\frac{1}{2}$ in. and from there to top of guide 3 in. Total height of drill above bench is $14\frac{1}{2}$ in., below $4\frac{1}{4}$ in., making extreme height of drill $18\frac{3}{4}$ in. The distance from end of base on bench to front of table is $9\frac{3}{4}$ in. with table bracket flush with end of column, table all way down and spindle up, the distance between table and end of chuck is 5 in., quite a large capacity for a Drill of this kind. A steel wrench is furnished for nut holding table bracket and to tighten clamp screw for bench.

TWO SPEEDS NO. 1005

Two speed, quickly changed by moving shifter on spindle, geared on fast speed 64 to 18, one revolution of crank gives $3\frac{1}{2}$ to spindle, on slow speed 14 to 14; one revolution of crank gives one to spindle, cut gears, $\frac{1}{8}$ in. diameter spindle, Three-Jaw polished and nickel plated tool steel chuck, $2\frac{3}{4}$ in. long, $1\frac{1}{8}$ in. diameter, holds Round Shank Drills up to $\frac{1}{2}$ in. diameter inclusive, 2 in. traverse of spindle (automatic feed), square thread, steel feed screw, hardened steel wearing parts. Weight each boxed about 57 pounds. Price, each..... \$27.00

The crank is 6 in. between centers. The bracket at base of column has a vertical adjustment of 5 in., the slide being $9\frac{1}{4}$ in. and bracket $4\frac{1}{4}$ in. long. The table on bracket has an independent movement of $1\frac{3}{4}$ in. by means of a $4\frac{1}{2}$ in. Hand Wheel and Screw, and can be used for feeding in emergencies, in addition to automatic feed. The table is $6\frac{3}{4}$ in. diameter, its center $3\frac{1}{2}$ in. from fall of slide. The lower end of bracket slide on column is 6 in. below base resting on bench; from bench the top of column is 18 in., and from there to top of guide is 4 in. Total height of drill above bench is 22 in., below 6 in., making extreme height of drill 28 in. The distance from end of base on bench to front of table is $13\frac{1}{2}$ in. With table bracket flush with end of column, table all the way down and spindle up, the distance between table and end of chuck is $7\frac{1}{2}$ in., quite a large capacity for a drill of this kind.

A steel wrench is furnished for nut holding table bracket and to tighten clamp screw for bench.

MILLERS FALLS

TWO SPEEDS NO. 210

A thoroughly efficient tool sold at a price that gives it unusual value. It is a rigid, strongly built, and accurate machine.

It is equipped with hand feed that is thoroughly adequate where the amount of drilling is not large and is necessary in doing delicate work where the speed of feeding has to be constantly and accurately under control.

The speed is instantly changed by turning the knurled sleeve. Ratio $1\frac{1}{2}$ to 1 and 4 to 1. Has an extensible crank from 3 to 6 in. radius.

Furnished with a three jaw Star chuck with protected springs to hold round shanks up to $\frac{1}{2}$ in.

Cast-iron frame unusually strong. Three frame bearings hold drill spindle and feed screw. A wrench is included to fit all nuts on the tool.

Chuck, knurled sleeve, spindle, and crank nicked. Large gear red, frame dark gray. Table and other machined parts are polished.

Height over all, 24 in. Maximum distance from chuck to table, 9 in. Weight, boxed, $27\frac{1}{2}$ pounds. Price each, \$16.50.

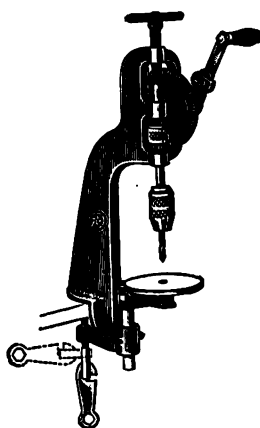


FIG. 60

BUFFALO BALL BEARING DRILLS

BUFFALO IMPROVED CHUCK

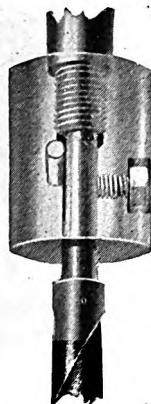


FIG. 63

This cut shows the Buffalo Improved Chuck regularly furnished with Drills Nos. 712W, 612, 614, 615, 616 and 619.



FIG. 62

SINGLE SPEED—NO. 712W

This is a substantial small drill for light work. Has only one speed and hand feed. Regularly furnished with hand wheel, but can be furnished with crank if desired. Fitted regularly with Buffalo "Improved" Chuck.

No.	Capacity Inches		Hand Power		Run Inches		Length Ov'all Inches	Spindle Dia. inch
	Holes up to	Drill Center of circle dia.	Price	Weight lbs.	Feed	Table		
712W	¾	11	.....	58	3½	9	33	⅝

All chucks are bored for ⅝-inch straight shank drills.

BUFFALO BALL BEARINGS

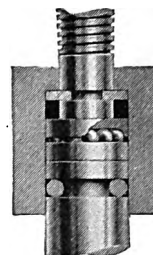


FIG. 61

SECTIONAL VIEW OF BALL BEARINGS

There is a right and a wrong place for ball bearings. In a drill, the only place they are of any practical value is at the end thrust of feed screw, to take up the heavy pressure against the top of the spindle and prevent binding; there is from five to ten times more friction at this point than anywhere else about the drill. Ninety per cent of this friction is relieved by ball bearings in the Buffalo Drills.

These ball bearings are made especially for the purpose, and are as perfect as it is possible to make them with the most modern high-class machinery. The ball race runs between two die-steel plates, turned from the solid bar and hardened, all wearing surfaces being ground and finished to the smoothness of glass.

BUFFALO SURE GRIP CHUCK

The simplest, safest chuck made. No set-screw to twist. No threads to strip. No wrench required.

Furnished on Buffalo Drills Nos. 124, 322, 418 and 421.

Insert bit as shown with the two "O's" and the flat of the shank directly in line. Then turn the collar half-way to the left. That's all—the bit is securely locked.

Explanation: There are only two parts in this chuck; the key and the Eccentric Collar. The key fits into a slot milled in the spindle. When turned to left, the eccentric collar presses the key firmly against the flat of the bit. To loosen it, turn collar back again.

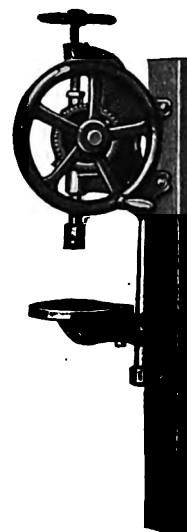
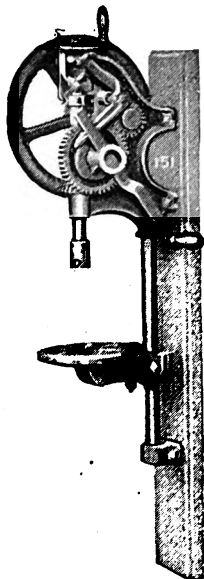
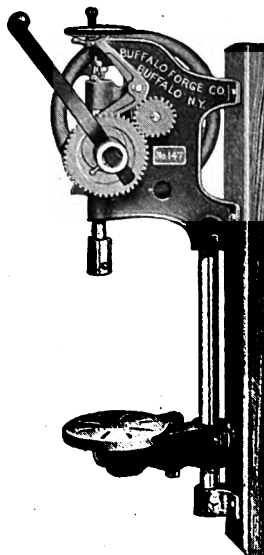


FIG. 3807

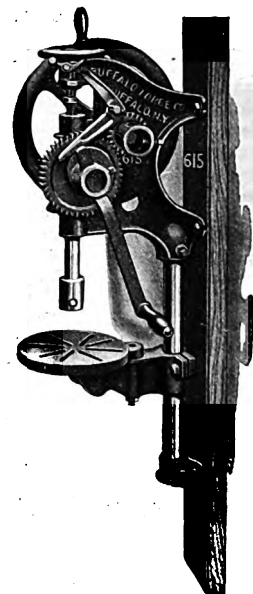
BUFFALO BALL BEARING DRILLS



NO. 612—FIG. 64



NO. 614—FIG. 3808



NO. 615—FIG. 3809

SINGLE SPEED—NO. 612

This is a good serviceable machine for medium work. Shaft and spindle of steel. Automatic feed is adjustable to coarse, medium and fine. Has round, slotted table adjustable to any position; sideways or up and down. Shafts, spindles and gears are accurately machine finished and fitted, and all bearings are bored and reamed in the solid metal, insuring a drill unsurpassed in easy, smooth operation, without lost motion. Automatic feed is adjustable to three speeds. Fitted with Buffalo "Improved" Chuck.

SINGLE SPEED—NO. 614

Has a strong well ribbed frame with shafts and spindle of steel, carefully turned and fitted. Two feeds, hand and automatic, are provided—the latter being adjustable to three speeds. Has one spindle speed. A hardened steel ball bearing takes up friction between spindle and feed screw. Table is slotted and can be easily raised or lowered or swung aside out of the way when desired. Fitted regularly with Buffalo "Improved" Chuck.

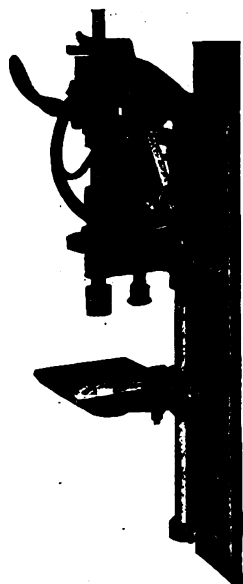
TWO SPEEDS—NO. 615

Frame is strongly ribbed and will withstand extremely rough handling. The shaft and spindle are of steel, are extra heavy and are carefully finished. All bearings are bored and reamed in the solid metal of the frame. This insures smooth, easy running. Gears are carefully made and accurately fitted. The end thrust of spindle is taken up by ball bearings, which take up 90% of all friction at this point. Has hand and automatic feeds and two speeds are obtained by changing handle from front to back gear. A round slotted table is provided which can be adjusted to any position—up, down or sideways. Regularly furnished with Buffalo "Improved" Chuck.

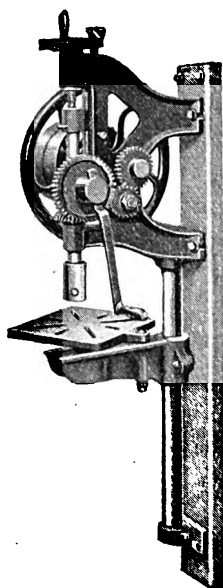
No.	Capacity Inches		Hand Power		Hand and Power		Run Inches		Length Over All Inches	Diam. of Pulley in.
	Holes up to	Drill Center of circle dia.	Price	Weight	Price	Weight	Feed	Table		
612	1	12	.....	65	.....	...	3	9	33	.
614	1	14	.....	96	.....	...	3	12	41	.
615	1½	15	.....	90	.....	110	3¼	10½	38	6

All chucks are bored for 5/8-inch straight shank drills.

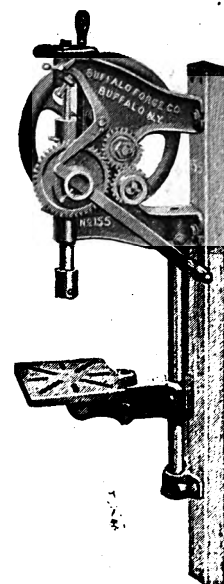
BUFFALO BALL BEARING DRILLS



NO. 421—FIG. 65



NO. 619—FIG. 66



NO. 616—FIG. 67

TWO SPEEDS—NOS. 421 AND 421A

The fly-wheel speed is independent of the spindle, giving full momentum where most needed—on slow, heavy work, where most other drills fail. The adjustable rack gives quick and easy adjustment of table. Table can be swung out of the way if desired. The gears are machine cut and mesh perfectly and are guarded. The shafts and spindles are of steel, run in journal bearings, bored and reamed in the solid metal of the frame. Two speeds. To change speed, shift the collar behind the chuck. Operation: Push collar up to frame for high speed and down to end of shaft for slow speed; the speed is thus changed in a second. Two feeds: automatic and lever. Change obtained by half a turn of small wheel at feed-screw head. The automatic feed is adjustable to three speeds. Full and instant return of spindle after each operation to highest point is effected simply by half a turn of small wheel; the spring does the rest. Regularly furnished with Buffalo Suregrip Chuck.

TWO SPEEDS—NOS. 616 AND 616A

Very heavy powerful drills, back geared and having two speeds. The change of speed is quickly and easily made by shifting the crank from the front to rear gear, or vice versa. Two feeds: hand and automatic. The hand feed is conveniently located at the top of feed-screw head, within easy reach of the operator. Automatic feed is adjustable to three speeds by just turning the small adjustment screw at the feed-screw head. Furnished with the Buffalo "Improved" Chuck. End thrust taken up by two hardened steel balls between feed screw and spindle. This reduces friction to a minimum. A square slotted table, adjustable either up or down or sideways is provided. Can be furnished with or without tight and loose pulleys.

TWO SPEEDS—NOS. 619 AND 619A

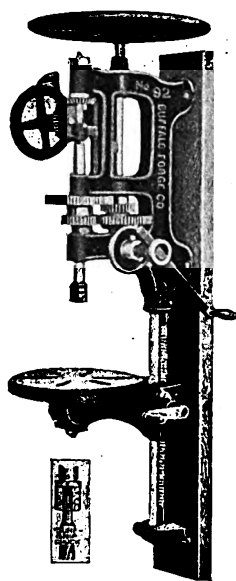
Particularly powerful drills. Adjustable table allows of quick and easy adjustment at any place between the spindle and a point fifteen inches below. Gears mesh perfectly. Shafts and spindles of steel run in journal bearings bored and reamed in the solid metal of the frame. The end-thrust of the swiftly revolving drill spindle is balanced on ball-bearings, insuring ease of operation with the least possible friction. No loose joints, with consequent lost motion, wear and noise. Smooth, quiet, easy-running drills. Two speeds. Change of speed is quickly and easily made by changing crank from front to rear gear, or vice versa. Triple drive gears. The crank turns forward on both speeds. Two feeds: hand and automatic. Hand feed is conveniently located at the top of the feed screw head within easy reach of the operator. Automatic feed is adjustable to three speeds by turning a small adjustment screw, located on the right side of frame, just above the drive gear. Will satisfactorily handle any work to full capacity. Regularly furnished with Buffalo "Improved" Chuck.

No.	Capacity Inches		Hand Power		Hand and Power		Run Inches		Length Over All Inches	Dia. of Pulleys in.
	Holes up to, inches	Drill Center of circle dia. in.	Price	Weight	Price	Weight	Feed	Table		
421	1½	21	.....	280	.....	...	4½	21	62	...
421A	1½	21	.....	...	.....	300	4½	21	62	8x3
616	1½	16	.....	125	.....	...	3¼	12	38	...
616A	1½	16	.....	...	.....	158	3¼	12	38	6
619	1½	19	.....	220	.....	...	5	15	52	...
619A	1½	19	.....	...	.....	240	5	15	52	8

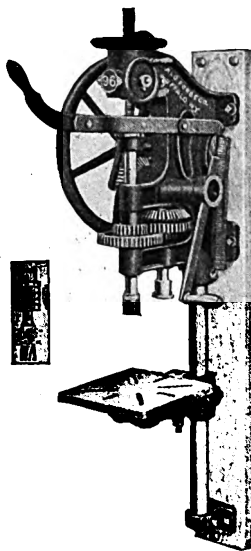
All chucks are bored for ⅝-inch straight shank drills.

FOR WALL RADIAL DRILLS SEE PAGE 805

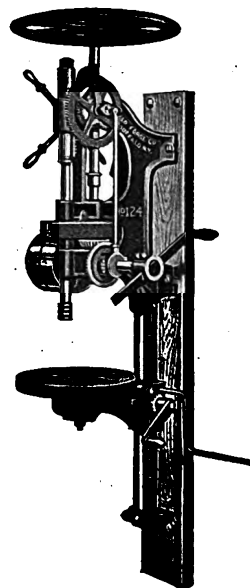
BUFFALO BALL BEARING DRILLS



NO. 322—FIG. 68



NO. 418—FIG. 69



NO. 124—FIG. 70

TWO SPEEDS—NOS. 322 AND 322A

These drills are of large capacity, strong and simple. All shafts and spindles are of steel, accurately machined and finished. Gears are machine cut and accurately fitted and guarded, resulting in smooth operation without lost motion. Two speeds; change obtained by sliding gears on spindle up or down, to engage with the upper or lower gear on fly-wheel shaft. The crank turns forward on both speeds. Two feeds: hand and automatic, the latter quickly adjusted to coarse, medium or fine, according to the nature of the work. Hand feed wheel is located on left side of feed-screw head. The table is quickly raised or lowered by turning small crank. It can also be swung to side. Wheel-holder free with each drill. Buffalo ball bearings at end thrust of feed screw relieve 90% of all friction at this vital point. Fitted with Suregrip Chuck.

TWO SPEEDS—NOS. 418 AND 418A

Machine-cut gears of accurate mesh and fit. Shafts and spindles of polished steel. Flywheel heavy and out of the way. Adjustable table rack. The flywheel speed is independent of the spindle, giving full momentum where most needed — on slow, heavy work, where other drills fail. Fast or slow speed — selected by pushing collar behind chuck up or down without stopping drill. Lever and automatic feed — the latter adjustable to three speeds by turning a small screw. Automatic "Quick-Return" of spindle and feed screw to highest point, ready for the next job. One hand releases the spindle while the other handles the work — another exclusive feature. Ball bearing end thrust between feed screw and spindle is taken up by hardened steel ball. This eliminates 90% of friction at this point. Table is square and can be raised or lowered by rack and pinion. It can be swung out of the way if desired. Fitted with Suregrip Chuck.

TWO SPEEDS—NOS. 124 AND 124A

All gears are machine cut, accurately meshed, fitted and guarded. Two speeds, fast and slow, change made instantly by means of sliding collar. Two feeds: hand and automatic. Hand feed obtained by planetary gears and rack and pinion operated by four-arm lever. Automatic feed obtained by means of planetary gears. Four speeds possible. Change from hand to automatic feed and vice versa made instantly by means of sliding collar. Has round slotted adjustable table. Fitted with Suregrip Chuck.

No.	Capacity Holes up to	Drill Center of circle dia. Inches	Hand Power		Hand and Power		Run Inches		Length Overall Inches	Dia. of Pulleys
			Price	Weight	Price	Weight	Feed	Table		
*124	1½	24	.....	390	.....	...	7½	20	72	...
*124A	1½	24	.....	...	.....	410	7½	20	72	8x3
322	1½	22	.....	385	.....	...	6¼	21	66	...
322A	1½	22	.....	...	.....	405	6¼	21	66	8x3
418	1½	18	.....	245	.....	...	4½	18	62	...
418A	1½	18	.....	...	.....	265	4½	18	62	8x3

All chucks are bored for ⅝ inch straight shank drills. *Can also be furnished for No. 2 Morse Taper.

U. S. ELECTRICAL HAND OR BREAST DRILLS

We illustrate on the following pages, the U. S. Portable Electrically Driven Hand and breast Drills, for drilling holes in wood and metal.

United States Electric Drills are recommended to drill 50% larger holes in wood than in iron.

The motors of the U. S. Electrical Drills are made of the best material which can be obtained, as the principal feature of electrical drills is to obtain as great amount of horsepower as possible in small space, and still keep the drills light in weight.

The casings of the U. S. Electrical Drills are constructed out of aluminum, which makes the drills light in weight. The motors are of the air-cooled type, and this is an important feature on electric tools—to keep them cool. The motor drum is of steel forging. A ball-bearing thrust is used to take up the thrust bearing on the chuck spindle.

All gears are hardened and run in grease.

The drills are under perfect control at all times, as the motor is provided with a switch in the handle to start and stop same.

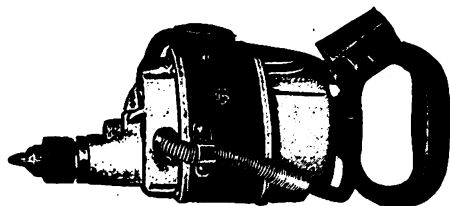
U. S. Drills are without a doubt the greatest time and labor saving tools ever placed on the market. Each drill is thoroughly tested before leaving the factory.

The U. S. drills are sent out complete with chuck, cord and attachment plug. Attach to any incandescent lamp socket direct and alternating current.

Universal Motor Drills will operate as either direct current or same voltage alternating current on 25, 30, 40 or 60 cycle.

In ordering Alternating Current Electric Drills: When an Electric Drill is to be run from the lamp socket, it should be ordered for single phase current, as you can only obtain single phase on the lamp socket. When the tool is to be ordered for operating off of the power circuit, then the motor must be wound for two or three phase current.

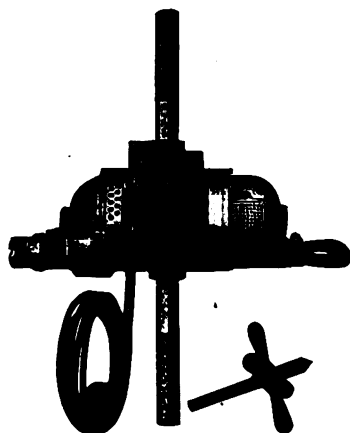
LIGHTEST AND SMALLEST DRILL MADE—AIR COOLED



TYPE A—FIG. 71

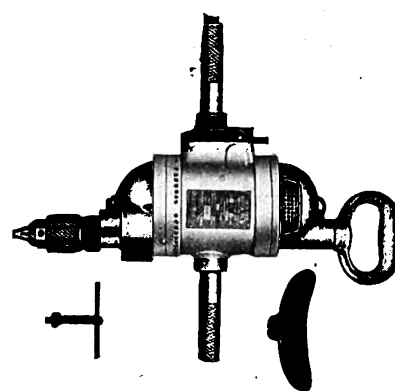
Smallest electric drill. It was especially designed for light drilling. It drills up to $\frac{1}{8}$ -inch in metal or $\frac{1}{4}$ -inch in wood. It is very handy for drilling name plate holes, oil holes, and for small holes in wood. Drill is fitted with chuck eccentric for close corner drilling. Direct current only.

7-8 AND 1-4 INCH UNIVERSAL MOTOR DRILL



TYPES EU AND GU—FIG. 82

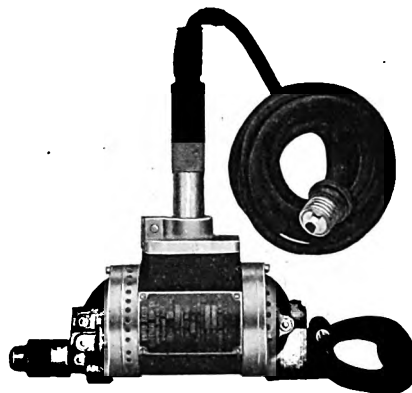
The drill shown here fills a long-felt want, as you can take this drill to any job where the voltage is 110 or 220 volts and attach the plug to the lamp socket whether direct or alternating current. Drill illustrated is of $\frac{7}{8}$ -inch and $1\frac{1}{4}$ -inch capacity in steel.



TYPE CU—FIG. 74

This cut shows the $\frac{3}{8}$ -inch Universal motor drill for use on direct or alternating current of 25, 30, 40, 50 or 60 cycle single phase. Breast plate furnished instead of grip handle if desired.

3-16 AND 1-4 INCH UNIVERSAL MOTOR DRILL

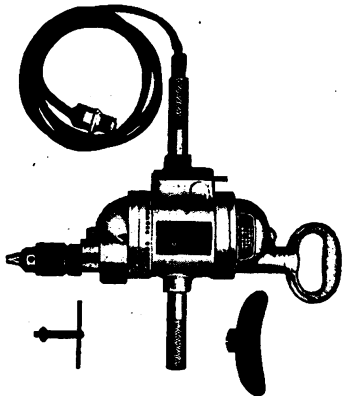


TYPES AU AND BU—FIG. 72

This cut shows the $\frac{1}{2}$ and $\frac{1}{4}$ -inch Universal motor drill, for use on direct or alternating current, of 25, 30, 40, 50 or 60 cycle.

U. S. ELECTRICAL HAND OR BREAST DRILLS

1-2 INCH UNIVERSAL MOTOR DRILL



TYPE DU—FIG. 78

The $\frac{1}{2}$ -inch universal motor drill operates on either direct or alternating current of 60 cycle or less. This type of drill is of great value to contractors or others who have work to do in different localities where the current may change. Breast plate furnished instead of spade handle or screw feed when so ordered.

1-2 INCH SINGLE SPEED DRILL



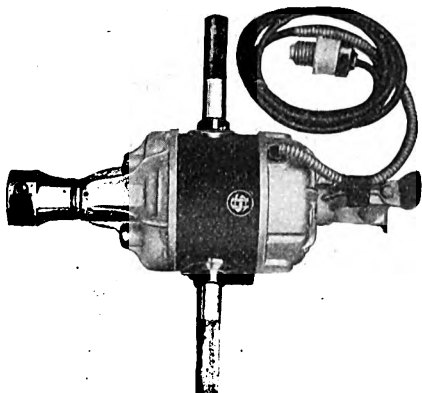
TYPE D—FIG. 75

One-half-inch single speed drill. This drill is also fitted with a screw feed when ordered, and is built so as to stand the hard usage that tools of this character are subject to.

Direct current.

Will drill $\frac{1}{2}$ -inch hole through steel $1\frac{1}{8}$ -inch thick in one minute and fifteen seconds.

1-2 INCH HEAVY DUTY DRILL

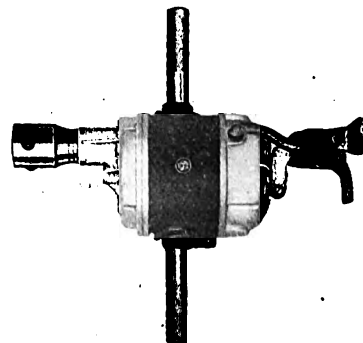


TYPES DE AND DEA—FIG. 79

This drill was designed for shops that require a tool that will stand hard usage. It is made with a large surplus of power, and can not be stalled or stopped with a $\frac{1}{2}$ -inch twist drill drilling in steel. One handle can be removed. Drill can be furnished with screw feed.

Direct current or alternating current.

1-2 INCH HEAVY DUTY CORNER DRILL



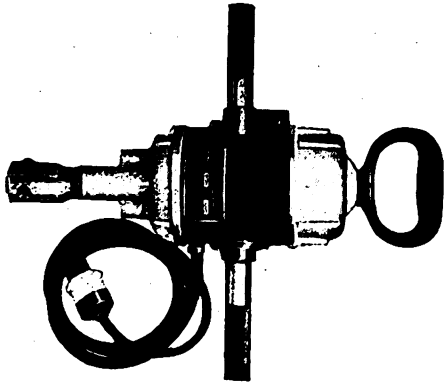
TYPES DB AND DBA—FIG. 77

One-half-inch new-style single-speed drill. This drill was designed for hard service, and has power enough to drive $\frac{1}{2}$ -inch twist drill through steel without stalling the motor.

Made for direct or alternating current.

U. S. ELECTRICAL HAND OR BREAST DRILLS

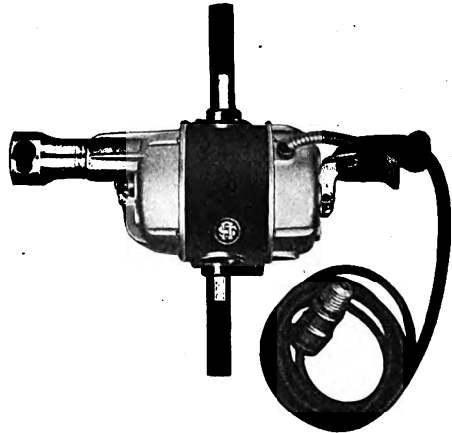
3-8 INCH HEAVY DUTY DRILL



TYPE CB—FIG. 73

Heavy duty drill with chuck spindle in the center of the drill. Will drill through $\frac{1}{8}$ -inch steel in one minute and five seconds with $\frac{3}{8}$ -inch drill. Direct current.

1-2 INCH TWO SPEED DRILL



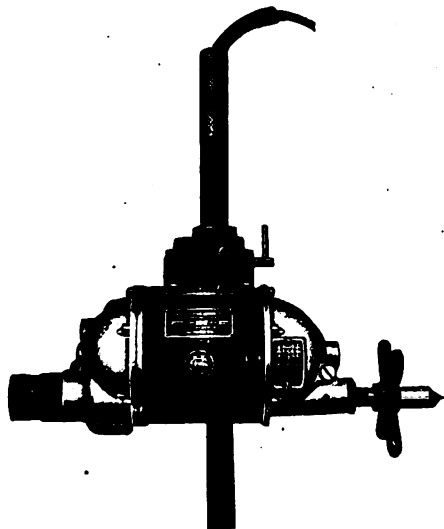
TYPES DD AND DDA—FIG. 76

Two speed $\frac{1}{2}$ -inch drill, giving a speed of 400 r. p. m. and 700 r. p. m.

To change speed, pull out knurled nut, give a half turn, and let go. Speed can be changed while the drill is running. The bottom handles can be taken off for close-corner drillings. This type drill is very desirable for drilling close up to the work and for corner drilling.

Made for direct or alternating current.

1 AND 1 1-4 INCH SINGLE OR TWO SPEED DRILL



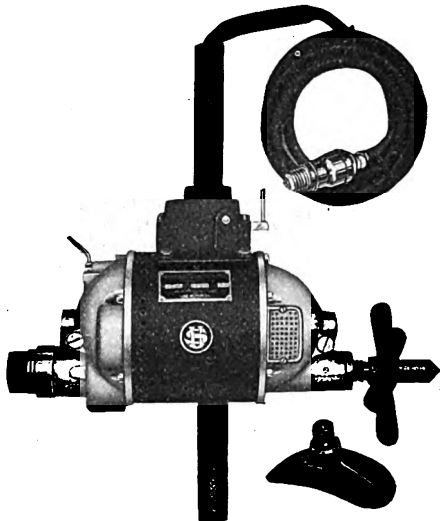
TYPES F AND G—FIG. 81

This cut shows the 1 and $1\frac{1}{4}$ -inch drill. Types F and G. The drill is removed by taking off nut on end of spindle and driving drill out of sleeve. This tool is regularly equipped with a No. 3 Morse taper.

These drills are made with two speeds when so ordered. Direct and alternating current.

Universal motor drills designed to operate on direct current or alternating current, 25, 30, 40, 50 or 60 cycle.

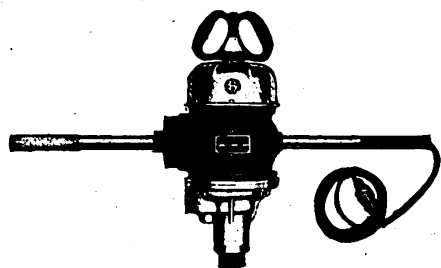
3-4 INCH SINGLE OR TWO SPEED DRILL



TYPES E AND EA—FIG. 80

The type E drill is fitted with a screw feed and No. 2 Morse taper socket. The drill is removed by taking nut off end of spindle and driving drill out of sleeve fitted with breast plate for countersinking and wood drilling when desired. Type E drill can be furnished with two speeds, when so ordered; this will be charged for extra. Made for direct or alternating current.

UNITED STATES ELECTRICAL DRILLS

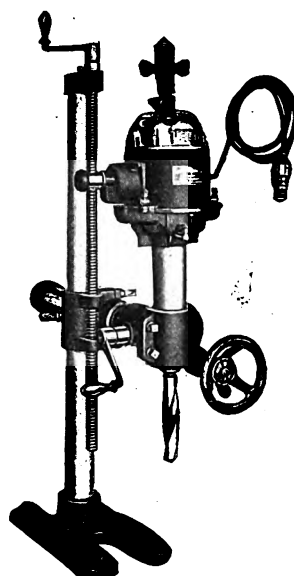


TYPES Y AND YA—FIG. 83

FOR LARGE DRILLING AND REAMING

This drill can be made with a higher speed for reaming. Direct current or alternating of 110 or 220 on 60 cycle 2 or 3-phase current only. Fitted with No. 4 Morse taper. Fitted with screw feed for drilling.

Gears run in grease, and are separated from motor windings. Direct or alternating current.

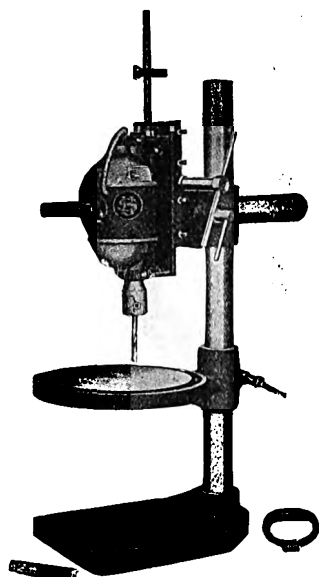


TYPES EG & GF—FIG. 84

PORTABLE RADIAL DRILL TYPES EG & GF

The tool illustrated above is a portable electrically driven radial drill which is manufactured in two sizes, drilling up to $\frac{3}{8}$ -inch and $1\frac{1}{4}$ -inch capacity in steel. These drills are self-contained and are portable, operated off of the ordinary incandescent lamp socket. They are light in weight, and can be easily carried to the work, and will take care of large work which can not be gotten under a drill press. You will note the eye bolt which is used for carrying the drill about the shop by means of a traveling crane or by placing a bar through the eye bolt for two men to carry the drill.

The drill will operate at any angle. It also has a graduating line on the horizontal arm, so that a square does not have to be used to get the drill central. The switch for starting and stopping the drill is located on the motor, which is enclosed in a case. The collar on top of the vertical arm is made with a ball-bearing so that the drill can be swung around freely. Any desired length of cord can be used and attached to the ordinary incandescent lamp socket, and one man can easily handle the drill. A longer horizontal arm can be furnished when desired.



TYPE I FIG. 3810

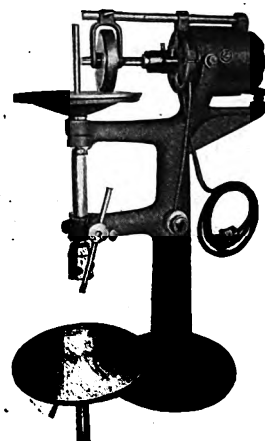
TYPE I—BENCH DRILL STAND

Above illustrates the use of U. S. Electric Drills with bench stand. Can be carried anywhere, with drill attached and connected up to nearest light socket, this tool is ready for use. Electric drill can be quickly disengaged and used as a portable hand drill.

Stand is made for the $\frac{3}{8}$ -inch, $\frac{1}{2}$ -inch, $\frac{3}{4}$ -inch, $\frac{7}{8}$ -inch, 1-inch and $1\frac{1}{4}$ -inch portable drills. Drills can be set to any angle.

Stand for $1\frac{1}{4}$ -inch drill is provided with hand wheel, screw feed.

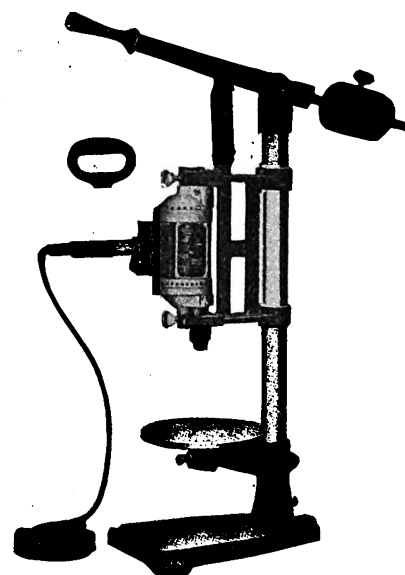
In ordering state for type of drill wanted.



TYPE S—FIG. 85

U. S. PORTABLE ELECTRICALLY DRIVEN BENCH DRILLS

Easy to Move—Just set it on the Bench. Direct or alternating current.



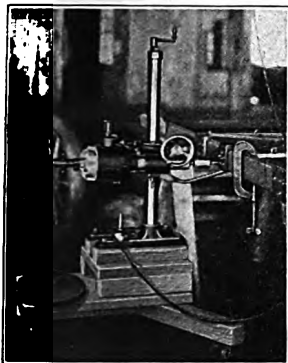
TYPE O FIG. 3811

TYPE O—PORTABLE STAND

This illustrates the use of U. S. Small Portable Drills on bench stand. Made for Types AU $\frac{1}{8}$ -inch and BU $\frac{1}{4}$ -inch drills only. Set anywhere on bench and attach to nearest electric light socket.

Drill can be quickly removed from stand and used as a portable hand drill if desired.

U. S. ELECTRICAL HAND OR BREAST DRILLS



SPECIFICATIONS OF DRILLS

HAND OR BREAST DRILLS.

With chucks, Direct, Alternating and Universal 110-220 volts.

Capacity in steel Inches	Weight Pounds		Speed R. P. M.		Type			Prices		
	Direct Alternat- ing	Universal	Direct Alternating	Universal	Direct Current	Alterna- ting Current	Universal	Direct Current	Alternat- ing Current	Univer- sal
$\frac{1}{8}$	6	6	1000	1400	A	...	AU	.....	.....	.....
$\frac{1}{4}$	9	7	900	900	B	...	BU	.....	.....	.....
$\frac{3}{8}$	12	12	800	750	C	CA	CU	.....	.....	.....
$\frac{1}{2}$	14	..	800	....	CB	T	...	.....	.....	.....
$\frac{5}{8}$	21	18	450	450	D	U	DU	.....	.....	.....
$\frac{3}{4}$	27	..	400-700	....	DD	DDA	...	.....	.....	.....
$\frac{7}{8}$	26	..	450	....	DB	DBA	...	.....	.....	.....
$1\frac{1}{8}$	30	..	450	....	DE	DEA	...	.....	.....	.....
$1\frac{1}{4}$	..	28	....	280	...	...	EU	.....	.....	.....
$1\frac{1}{2}$	..	41	....	180	...	...	GU	.....	.....	.....

Weights as given are for Direct Current Drills. Alternating Current Drills are slightly heavier.

SCREW FEED DRILLS, WITH TAPER SOCKET

Direct and Alternating Current, 110-220 volts.

Capacity in steel inches	Weight Pounds	Speed R.P.M.	Type		Prices	
			Di- rect Cur- rent	Alter- nating Cur- rent	Direct Current	Alter- nating Current
$\frac{3}{8}$	47	280	E	EA	.....	.....
$\frac{1}{2}$	48	400-280	EE	EEA	.....	.....
1	49	200	F	FA	.....	.....
1	40	200-450	FF	FFA	.....	.....
$1\frac{1}{4}$	52	180	G	GA	.....	.....
2	86	105	Y	YA	.....	.....

Weights as given are for Direct Current Drills. Alternating Current Drills are slightly heavier.

SCOTCH RADIAL DRILLS—DETACHABLE MOTOR DRILL

Direct and Alternating Current, 110-220 volts.

Capacity in steel Inches	Weight Pounds	Speed R. P. M.	Type		Prices	
			Di- rect Cur- rent	Alter- nating Cur- rent	Direct Current	Alter- nating
$\frac{1}{8}$	145	240	EG	EGA	.....	.....
$\frac{1}{4}$	148	400-240	EEG	EEGA	.....	.....
$1\frac{1}{4}$	165	180	GF	GFA	.....	.....
$1\frac{1}{2}$	475	250-180	W	WA	.....	.....

PORTABLE BENCH DRILLS AND STANDS—Direct and Alternating Current 110-220 Volts

Drills in Metal, Inches.....	$\frac{1}{2}$	Hold $\frac{1}{8}$ - $\frac{1}{4}$	Hold $\frac{3}{8}$ - $\frac{1}{2}$	Hold $\frac{3}{4}$ -1- $1\frac{1}{4}$
Total Height, Inches.....	32 $\frac{1}{2}$	36	37	37
Dia. of Table, Inches.....	12	7	15	15
Weight, Lbs.	112	45	150	160
Speed, R. P. M.	390-950	.....	.....	.....
Type	S	O	1	2
Price, Direct .....	.....	.....	.....	.....
Price, Alternating.....	.....	.....	.....	.....

PNEUMATIC DRILLS

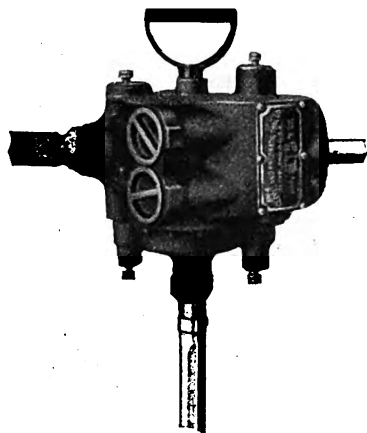


FIG. 86
REAMING MACHINE

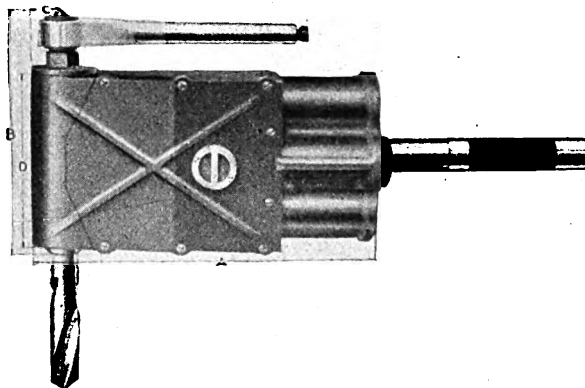


FIG. 87—CLOSE QUARTER DRILL

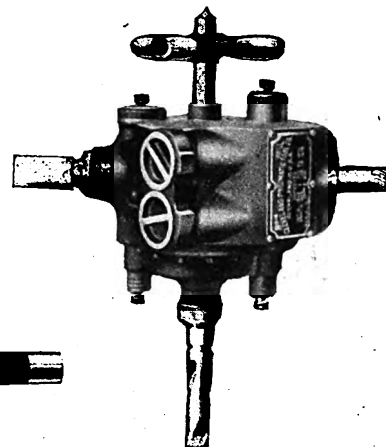


FIG. 88
AIR DRILL

For drilling, reaming and tapping in metal in the following styles: Non-Reversible, Reversible, Compound Non-Reversible, Compound Reversible, Close Corner Non-Reversible, Close Corner Reversible.

Diameter Drilling Capacities.....	Inches	$\frac{1}{2}$	$\frac{3}{8}$	$\frac{1}{2}$	$1\frac{1}{4}$	$2\frac{1}{2}$	3
" Reaming	Inches	$\frac{1}{8}$	$\frac{1}{2}$	1	2	$2\frac{1}{2}$	
" Tapping	Inches	$\frac{1}{2}$	$\frac{5}{8}$	1	$1\frac{1}{2}$	2	$2\frac{1}{2}$

Prices on application

"BUFFALO" 10-INCH SENSITIVE BENCH DRILL

FOR LIGHT AND RAPID DRILLING

The Buffalo 10-inch Sensitive Power Bench Drill has a substantial one-piece frame, insuring perfect alignment of gears and shafts. Gears are carefully machined and fitted. The upper cone pulley is supported between the bearings instead of being over-hung. This type of construction increases the power materially and reduces unnecessary strain on shaft.

The countershaft is supplied with tight and loose pulleys and belt shifter.

The feed lever and spindle is held in position by means of a friction spring which automatically keeps the spindle where it is placed.

The work table is adjustable up and down or can be pushed to one side. In this connection it is especially important to note that the base can be used as a table. The base is carefully and accurately planed and has countersunk bolts.

This machine is very compact and is especially desirable for garages, machine shops, etc., wherever accurate small work is done.

It will drill holes up to $\frac{1}{8}$ inch with great speed and accuracy.

DIMENSIONS

Drills to center of a 10-inch circle.
Bores holes up to $\frac{1}{8}$ -inch in diameter.
Up and down run of spindle 3 inches.
Up and down run of table 9 inches.
Greatest distance from table to spindle $9\frac{3}{4}$ inches.

Greatest distance from planed base to spindle 16 inches.

List price.....

Diameter of column $2\frac{1}{2}$ inches.
Size tight and loose pulleys $4 \times 1\frac{5}{8}$ inches.
Size of large cone pulley $4\frac{1}{2} \times 1\frac{5}{8}$ inches.
Size of small cone pulley $3 \times 1\frac{5}{8}$ inches.
Spindle is bored with No. 1 Morse taper hole.
Height, $33\frac{1}{2}$ inches. Weight, 110 pounds.
Size of table 7×8 inches.

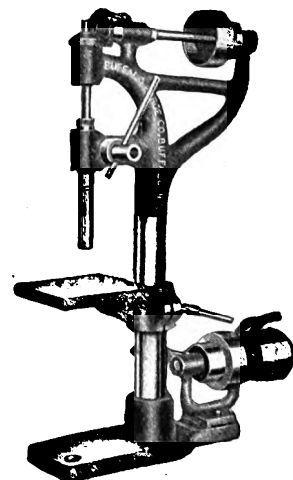
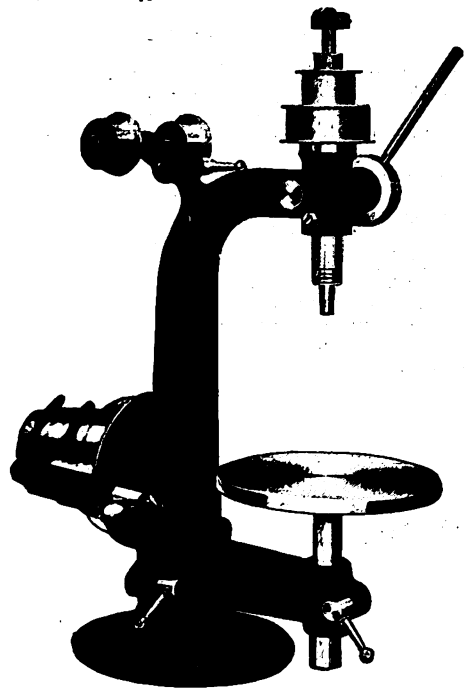


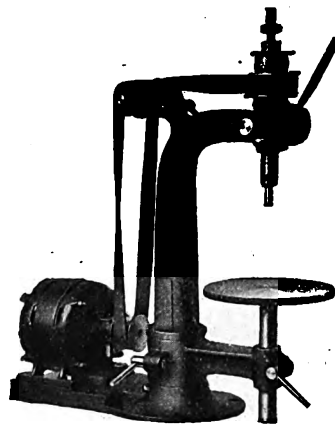
FIG. 3824

BURKE 10-INCH SENSITIVE BENCH DRILLS**BELTED OR MOTOR DRIVEN****NO. 0 PRESS HAS STATIONARY TABLE.****NO. 1 PRESS HAS SWINGING TABLE.**

The No. 0 and No. 1 Sensitive Drill Presses have double flange top cone, ball bearing thrust and screw adjustment to stop. The spindle and quill are both ground to size and all parts interchangeable. They have attached countershaft and taper adjusted to fit $\frac{1}{8}$ -inch Almond, Jacobs or No. 2, $\frac{3}{8}$ Parker Chucks. Can be furnished mounted on pedestal if desired, at extra price.

**BELT DRIVEN—FIG. 91.**

The Motor Driven Press is equipped with General Electric motor, either alternating current 110 or 220 volt, 60 cycle single phase, or direct current 110 or 220 volts.

**MOTOR DRIVEN—FIG. 3812.**

Number	0	1
Greatest Distance Spindle to Table... inches	7½	7½
Vertical Movement of Spindle	2½	2½
" " " Table.....	7	7
Diameter of Table.....	8	8
Center of Spindle to Frame.....	5½	5½
Drilling Capacity.....	0 to ¾	0 to ¾
Size of Tight and Loose Pulleys.....	1½ x 4	1½ x 4
Speed " " " rev. per min.	550	550
Weight, Net..... pounds	45	50
" Crated.....	60	65
Weight, Net Motor Driven.....	75	80
" Crated Motor Driven...	100	105
Price..... each		

WESTERN CHIEF SENSITIVE BENCH DRILL**No. 28**

This is an accurate and highly finished sensitive bench drill made for machine shop and garage use to operate by power.

DIMENSIONS

Drills to the center of a 9-inch Circle.

Bores 0 to ½ inch.

Vertical traverse of Spindle, 3½ in.

Vertical traverse of Table, 8 inches.

Greatest distance from Table to Spindle, 8 inches.

Diameter of Columns, 2½ inches.

Size of tight and loose Pulleys, 4 x 1½ in. Should run 650 revolutions per minute.

Size of large Cone Pulley, 4¾ x 1½ inches.

Size of small Cone Pulley, 3 x 1½ inches.

Spindle is fitted with holes for drills having No. 1 taper shanks.

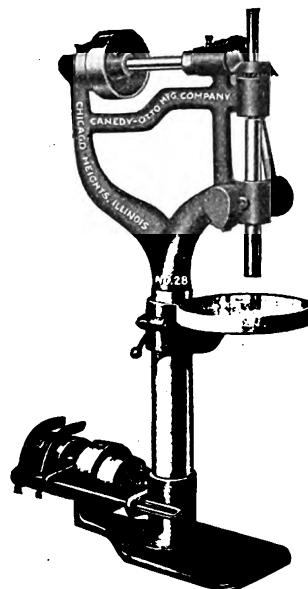
Height, 32 inches.

Weight, 85 pounds.

List price.....

NO. 28 MOTOR DRIVEN DRILL

This drill can be furnished equipped with motor direct connected with spur gear drive to lower cone. Weight 120 lbs Price on application.

**FIG. 89.**

B & E HIGH SPEED PLAIN BEARING SENSITIVE BENCH DRILL

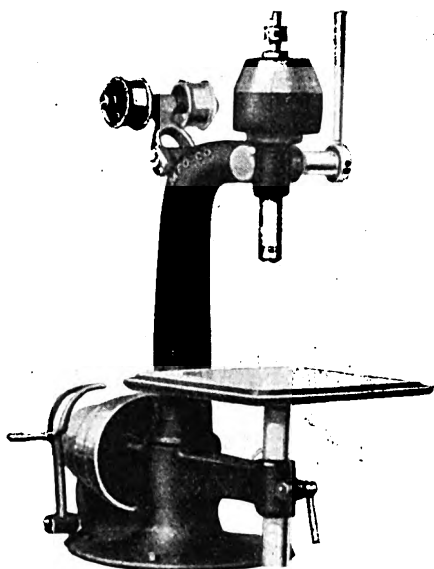


FIG. 92

This machine has a spindle bored No. 1 Morse Taper. The table is of a square pattern and contains a large oil rim. The cylindrical and flat surfaces are ground true to size. All parts are standard throughout and are interchangeable. The machine is tested out at a speed of 3500 R. P. M. for six hours but we do not recommend a higher speed than 2000 on actual work.

SPECIFICATIONS

Greatest distance from spindle to table	12 inches
Vertical movement of spindle	3½ inches
Hole in spindle	No. 1 Morse taper
Vertical movement of table	6 inches
Table	11½x11½ inches
Distance from center of spindle to frame	7⅝ inches
Drilling capacity	0 to ½ inch
Diameter of tight and loose pulley	1⅝ x 5 inches
Changes of speed	2
Speed of driving pulley	550 revolutions
Weight of machine without column	110 pounds
Weight of machine with column	215 pounds
Weight of machine ready for shipment	135 pounds
Weight of machine with column ready for shipment	240 pounds
Price on application.	

LINDGREN 13-INCH BENCH DRILL

This machine is designed for all kinds of light work such as tool and die work. The spindle is equipped with ball thrust bearings. The sleeve is graduated in inches. The table can be swung around the column so that work may be set on base of drill when necessary. It is a very convenient bench drill.

The upper cone pulley shaft runs in split bearings, which are Babbitt lined and have chain oilers.

SPECIFICATIONS

	Inches
Height of Drill	37¾
Greatest distance from spindle to base	21
Greatest distance from spindle to table	15
Greatest distance from column to center of spindle	6½
Diameter of Column	3½
Vertical travel of spindle	4¼
Vertical travel of table	11
Size of table	9 x 11
Spindle fitted for Morse No. 1 Taper	
Cone pulley has 5 steps	
Diameter of large pulley on cone	6
Diameter of small pulley on cone	2
Cone pulleys carry 1¼ inch belt	
Size of tight and loose pulleys	5
Tight and loose pulleys carry 1½ inch belt	
Diameter of spindle in sleeve	1½
Speed of driving pulleys	800 rev. per min.
Floor space required	32 x 12
Weight net	155 lbs.
Weight crated	185 lbs.
Price on application.	

The crown gear is fitted with a thrust bearing at the end of the hub where a fiber washer is placed to prevent oil leakage.

There is a large chamber fitted with felt for the purpose of retaining the oil and which assures constant lubrication of the bearing.

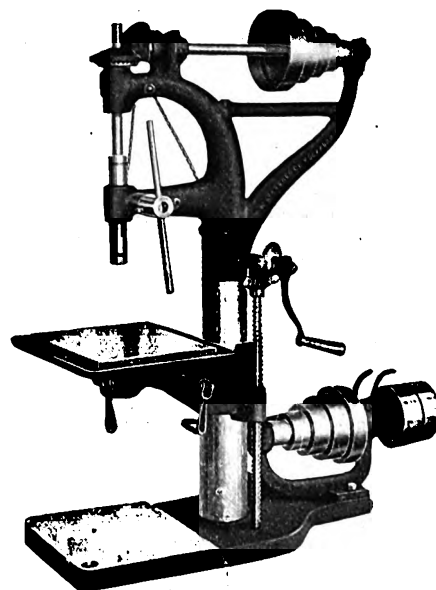


FIG. 94

14-INCH SENSITIVE FLOOR DRILL.

This drill is designed to drill holes $\frac{1}{2}$ inch and smaller in a quick and accurate manner. The spindle is provided with a ball thrust bearing to take the thrust of the spindle and thus effects a great saving in power.

The spindle is counter-balanced by a weight inside the column. To prevent undue strain on the hand feed gear a key is

provided in the head, entering a key way in the rack which guides the spindle. Vertical adjustment of the head can be made, a handle clamping it to the column.

TABLES—The machine is provided with two tables. The square table can be swung around the column and can also be tilted to any angle desired. A bolt is provided for clamping it to any required position. The apron on the side is a very convenient and desirable feature. The round table rests in a bracket and is vertically adjustable on the column. It can be clamped in any vertical position by the locking handle. This table can be removed and the cup center or crotch center used in the bracket. Both of these centers are furnished with the machine.

COUNTERSHAFT—The countershaft is of standard construction, provided with two hangers, drip cups, tight and loose pulleys, cone pulley and shifter.

SPECIFICATIONS

Height of Column.....	5' 4"
Total Height Spindle Up.....	6' 6"
Largest Size Drill.....	$\frac{1}{2}$ "
Vertical Adjustment of Head.....	7 $\frac{1}{2}$ "
Diameter of Spindle (in Sleeve).....	$\frac{1}{8}$ "
Hole in Spindle Morse Taper.....	No. 2
Travel of Spindle.....	3"
Distance from Column to Center of Spindle.....	7"
Distance from Spindle to Square Table.....	0 to 12 $\frac{1}{2}$ "
Square Table Swing and Tilting.....	11" x 11"
Apron on Square Table.....	3 $\frac{1}{4}$ " x 11"
Distance from Spindle to Round Table.....	0" to 40"
Vertical Adjustment of Round Table.....	26"
Diameter of Round Table.....	10"
Floor Space.....	20" x 26"
Pulley on Spindle.....	4 $\frac{1}{2}$ " dia. x 1 $\frac{1}{4}$ " face
Speed of Countershaft.....	450 R.P.M.
Tight and Loose Pulley on Countershaft.....	5" dia. x 2" face
Gross Weight, including Countershaft, crated.....	300 lbs.

Can also be furnished motor driven. Prices on application.

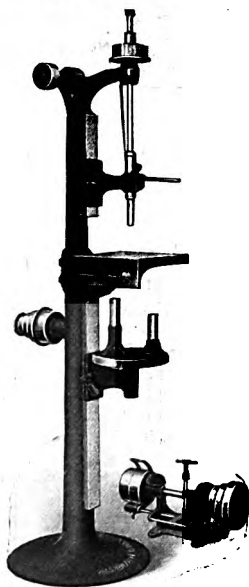


FIG. 3825

"ILLINOIS" 14-INCH FLOOR DRILL

This machine was designed to accommodate the demand for a durable drill embodying the necessary features with which to handle small and medium sized drilling work with the utmost facility, and with accuracy rarely obtained from the use of moderate priced machines. Illustration shows the plain machine, referred to in the following general description.

The Base which is liberally provided with ribs on the inside is unusually large and heavy, measuring 20 inches in diameter. Its design insures rigidity at this important point and lends greatly toward the general stiffness and solidity of the entire machine.

The column (cast hollow to receive spindle counterbalance weight) is of such design as will best resist the strains incident to present high speed drilling practice. The upper cone pulley shaft runs in split bearings of liberal proportions which are lined with a high grade of babbit metal.

Height to top of cone.....	68 in.
Drills to center of.....	15 in.
Distance between spindle and base.....	44 in.
Distance between spindle and table.....	33 in.
Diameter of column.....	4 in.
Diameter of table.....	13 in.
Diameter of spindle, least section.....	$\frac{7}{8}$ in.
Hole in spindle.....	No. 2 Morse Taper
Travel of spindle.....	6 in.
Travel of table.....	29 in.
Largest diameter of cone pulleys.....	8 in.
Width of cone pulley steps.....	1 $\frac{1}{8}$ in.
Tight and loose pulleys.....	7 in. x 2 $\frac{1}{2}$ in.
Speed of countershaft.....	400 R. P. M.
Floor space required.....	20 in. x 30 in.
Power required.....	1 H. P.
Capacity.....	$\frac{3}{4}$ in.
Shipping weight.....	495 lbs.

Prices on application. Shanks other than listed special prices.

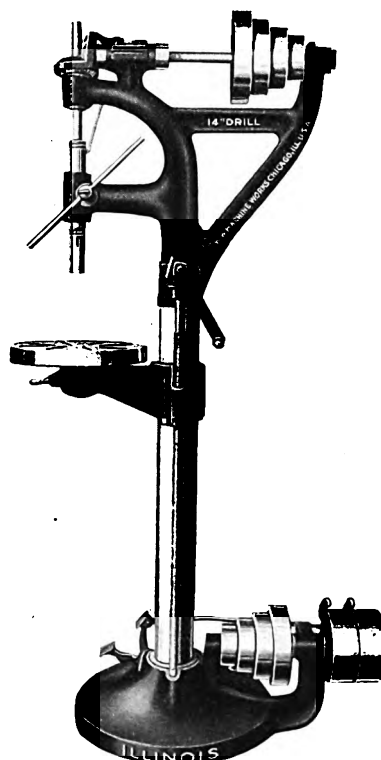


FIG. 95

FOR UPRIGHT DRILL PRESSES 20 INCHES AND LARGER, WALL AND FLOOR RADIAL DRILLS SEE PAGES 803 AND 804

HAND REAMERS

NO. 122—CARBON STEEL



NO. 600—HIGH SPEED STEEL

FIG. 97

Diameter Inches	Price Each		Length Over All Inches	Length of Flute Inches	Diameter Inches	Price Each		Length Over All Inches	Length Flute Inches
	Carbon Steel	High Speed				Carbon Steel	High Speed		
1/8	\$1.00	\$ 3.00	3	1 1/2	1 1/8	\$ 4.15	\$12.75	11 7/8	5 3/4
3/16	1.10	3.25	3 1/4	1 5/8	1 1/8	4.30	12.75	11 5/8	5 1/4
1/4	1.10	3.25	3 1/4	1 5/8	1 1/8	4.45	14.25	11 1/8	5 3/8
5/16	1.20	3.25	3 1/2	1 3/4	1 1/8	4.60	14.25	12	6
3/8	1.20	3.25	3 1/2	1 3/4	1 1/8	4.75	15.75	12 1/8	6 1/4
7/16	1.30	3.50	3 3/4	1 7/8	1 1/4	4.90	15.75	12 1/4	6 1/8
1/2	1.30	3.50	3 3/4	1 7/8	1 1/4	5.05	17.25	12 3/4	6 1/2
9/16	1.40	3.50	4	2	1 1/4	5.20	17.25	12 7/8	6 3/4
5/8	1.40	3.50	4	2	1 1/4	5.40	18.75	12 3/4	6 3/4
3/4	1.45	3.75	4 1/4	2 1/8	1 1/2	5.60	18.75	12 5/8	6 3/4
7/8	1.45	3.75	4 1/4	2 1/8	1 1/2	5.80	20.50	12 3/4	6 3/4
1	1.50	3.75	4 1/2	2 1/4	1 1/2	6.00	20.50	12 3/4	6 3/4
1 1/16	1.50	3.75	4 1/2	2 1/4	1 1/2	6.20	22.25	12 3/4	6 3/4
1 1/8	1.55	4.25	4 3/4	2 3/8	1 1/2	6.40	22.25	13	6 1/2
1 1/4	1.55	4.25	4 3/4	2 3/8	1 1/2	6.60	24.00	13	6 1/2
1 1/2	1.60	4.25	5	2 1/2	1 1/2	6.80	24.00	13	6 1/2
1 3/8	1.60	4.25	5	2 1/2	1 1/2	7.00	25.75	13	6 1/2
1 3/4	1.70	4.75	5 1/4	2 5/8	1 3/4	7.20	25.75	13	6 1/2
1 7/8	1.70	4.75	5 1/4	2 5/8	1 3/4	7.40	27.50	13 1/2	6 3/4
2	1.75	4.75	5 1/2	2 3/4	1 3/4	7.60	27.50	13 1/2	6 3/4
2 1/16	1.75	4.75	5 1/2	2 3/4	1 3/4	7.80	29.50	13 1/2	6 3/4
2 1/8	1.85	5.25	5 3/4	2 7/8	1 3/4	8.00	29.50	13 1/2	6 3/4
2 1/4	1.85	5.25	5 3/4	2 7/8	1 3/4	8.20	31.50	13 1/2	6 3/4
2 3/8	1.90	5.25	6	3	1 3/4	8.40	31.50	13 1/2	6 3/4
2 1/2	1.90	5.25	6	3	1 3/4	8.60	33.50	13 1/2	6 3/4
2 5/8	1.95	5.75	6 1/4	3 1/8	1 3/8	8.80	33.50	14	7
2 3/4	2.00	5.75	6 1/2	3 1/4	1 3/8	9.00	35.75	14	7
2 7/8	2.10	6.25	6 3/4	3 3/8	1 3/8	9.20	35.75	14	7
3	2.20	6.25	7	3 1/2	1 3/8	9.40	38.00	14	7
3 1/16	2.30	6.75	7 1/4	3 3/4	2	9.60	38.00	14	7
3 1/8	2.40	6.75	7 1/4	3 3/4	2 1/8	10.00	40.75	14 1/2	7 1/4
3 1/4	2.50	7.25	8 1/8	4 1/8	2 1/8	10.40	43.50	14 1/2	7 1/4
3 3/8	2.60	7.25	8 3/8	4 1/8	2 1/8	10.80	46.25	15	7 1/2
3 1/2	2.70	7.75	8 3/4	4 1/4	2 1/4	11.30	49.00	15	7 1/2
3 3/4	2.80	7.75	9 1/8	4 3/4	2 1/4	11.80	51.75	15	7 1/2
3 7/8	2.95	8.50	9 3/8	4 1/2	2 3/8	12.30	55.00	15	7 1/2
4	3.10	8.50	9 1/2	4 3/4	2 3/8	12.80	58.25	15 1/2	7 3/4
4 1/16	3.25	9.50	10 3/8	5 1/4	2 3/8	13.40	61.50	15 1/2	7 3/4
4 1/8	3.40	9.50	10 1/4	5 1/8	2 3/8	14.00	64.75	15 1/2	7 3/4
4 1/4	3.55	10.50	10 1/2	5 1/2	2 3/8	14.60	68.00	16	8
4 3/8	3.70	10.50	10 5/8	5 1/2	2 3/8	15.40	71.25	16	8
4 1/2	3.85	11.50	11 1/8	5 3/4	2 3/4	16.20	74.50	16	8
4 3/4	4.00	11.50	11 1/4	5 3/8	...	.....	.....	....	...

All sizes and dimensions not listed are special and subject to special prices.

These reamers are made with Eccentric Flutes and are slightly tapered on end to facilitate entering work.

HAND REAMERS

WITH SPIRAL FLUTES

NO. 122E—CARBON STEEL



NO. 604—HIGH SPEED STEEL

FIG. 98

Diam. Inches	Price Each		Length Over All Inches	Length of Flute Inches	Diam. Inches	Price Each		Length Over All Inches	Length of Flute Inches
	Carbon Steel	High Speed				Carbon Steel	High Speed		
1/8	\$1.20	\$3.00	3	1 1/2	3/16	\$ 2.75	\$ 6.75	7 1/4	3 1/4
1/4	1.30	3.25	3 1/4	1 5/8	1/4	2.90	6.75	7 1/4	3 1/4
3/8	1.30	3.25	3 1/4	1 5/8	3/8	3.00	7.25	8 1/8	4 1/8
1/2	1.45	3.25	3 1/2	1 3/4	1/2	3.10	7.25	8 3/8	4 1/8
5/8	1.45	3.25	3 1/2	1 3/4	5/8	3.25	7.75	8 3/4	4 1/4
3/4	1.55	3.50	3 3/4	1 7/8	3/4	3.35	7.75	9 1/4	4 1/4
7/8	1.55	3.50	3 3/4	1 7/8	7/8	3.55	8.50	9 3/8	4 1/4
1	1.70	3.50	4	2	1	3.70	8.50	9 1/2	4 1/4
1 1/8	1.70	3.50	4	2	1 1/8	3.90	9.50	10 3/4	5 1/4
1 1/4	1.75	3.75	4 1/4	2 1/8	1 1/4	4.10	9.50	10 3/4	5 1/4
1 1/2	1.75	3.75	4 1/4	2 1/8	1 1/2	4.25	10.50	10 1/2	5 1/4
1 3/4	1.80	3.75	4 1/2	2 1/4	1 3/4	4.45	10.50	10 7/8	5 1/4
2	1.80	3.75	4 1/2	2 1/4	2	4.80	11.50	11 1/4	5 5/8
2 1/8	1.85	4.25	4 3/4	2 3/8	2 1/8	5.15	12.75	11 5/8	5 1/2
2 1/4	1.85	4.25	4 3/4	2 3/8	2 1/4	5.50	14.25	12	6
2 1/2	1.90	4.25	5	2 1/2	2 1/2	5.90	15.75	12 1/4	6 1/8
2 3/4	1.90	4.25	5	2 1/2	2 3/4	6.25	17.25	12 3/4	6 3/8
3	2.05	4.75	5 1/4	2 5/8	3	6.70	18.75	12 5/8	6 1/2
3 1/8	2.05	4.75	5 1/4	2 5/8	3 1/8	7.20	20.50	12 3/4	6 1/2
3 1/4	2.15	4.75	5 1/2	2 3/4	3 1/4	7.70	22.25	13	6 1/2
3 1/2	2.15	4.75	5 1/2	2 3/4	3 1/2	8.15	24.00	13	6 1/2
3 3/4	2.20	5.25	5 3/4	2 7/8	3 3/4	8.65	25.75	13	6 1/2
4	2.20	5.25	5 3/4	2 7/8	4	9.10	27.50	13 1/2	6 3/4
4 1/8	2.30	5.25	6	3	4 1/8	9.60	29.50	13 1/2	6 3/4
4 1/4	2.30	5.25	6	3	4 1/4	10.10	31.50	13 1/2	6 3/4
4 1/2	2.35	5.75	6 1/4	3 1/8	4 1/2	10.55	33.50	14	7
4 3/4	2.40	5.75	6 1/2	3 1/4	4 3/4	11.05	35.75	14	7
5	2.50	6.25	6 3/4	3 3/8	5	11.50	38.00	14	7
5 1/8	2.65	6.25	7	3 1/2	5 1/8				

Spiral fluted hand reamers with threaded ends and all sizes and dimensions not listed are special and subject to special price

JOBBER'S REAMERS

WITH TAPER SHANKS

NO. 122B—CARBON STEEL



NO. 603—HIGH SPEED STEEL

FIG. 99

Diam. In.	Price Each		Length Over All Inches	Length of Flute Inches	Taper Shank	Diam. In.	Price Each		Length Over All Inches	Length of Flute Inches	Taper Shank
	Carbon Steel	High Speed					Carbon Steel	High Speed			
1/4	\$1.70	\$4.00	5 1/8	2	No. 1	1/4	\$2.05	\$5.25	5 1/8	2 1/2	No. 1
3/8	1.75	4.25	5 1/8	2		3/8	2.15	5.25	6 1/8	2 3/4	
1/2	1.75	4.25	5 1/8	2		1/2	2.15	5.25	6 1/8	2 3/4	
5/8	1.80	4.25	5 1/2	2 1/4		5/8	2.20	5.75	6 1/8	2 3/4	
3/4	1.80	4.25	5 1/2	2 1/4		3/4	2.20	5.75	6 1/8	2 3/4	
7/8	1.85	4.75	5 1/2	2 1/4		7/8	2.30	5.75	6 1/8	3	
1	1.85	4.75	5 1/2	2 1/4		1	2.30	5.75	6 1/8	3	
1 1/8	1.85	4.75	5 1/2	2 1/4		1 1/8	2.35	6.25	6 1/8	3	
1 1/4	1.90	4.75	5 1/2	2 1/2		1 1/4	2.40	6.25	6 3/4	3 1/4	
1 1/2	1.90	4.75	5 1/2	2 1/2		1 1/2					
1 3/4	2.05	5.25	5 1/2	2 1/2		1 3/4					
2						2					
2 1/8						2 1/8					
2 1/4						2 1/4					

Continued on Page 34

SPECIFY ALL TOOLS BY OUR LIST NUMBERS

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JOBBER'S' REAMERS

WITH TAPER SHANKS

NO. 122B—CARBON STEEL

NO. 603—HIGH SPEED STEEL



Continued from page No. 33

FIG. 100

Diam. In.	Price Each		Length Over All Inches	Length of Flute Inches	Taper Shank	Diam. In.	Price Each		Length Over All Inches	Length of Flute Inches	Taper Shank
	Carbon Steel	High Speed					Carbon Steel	High Speed			
$\frac{1}{8}$	\$2.50	\$ 6.75	$7\frac{1}{8}$	$3\frac{1}{2}$	No. 2	$\frac{1}{8}$	\$ 6.25	\$18.25	$12\frac{1}{8}$	$6\frac{1}{4}$	No. 4
$\frac{1}{4}$	2.65	6.75	$7\frac{1}{8}$	$3\frac{1}{2}$		$\frac{1}{4}$	6.50	19.75	$12\frac{1}{8}$	$6\frac{1}{4}$	
$\frac{3}{8}$	2.75	7.25	$7\frac{1}{8}$	$3\frac{1}{2}$		$\frac{3}{8}$	6.70	19.75	$12\frac{1}{8}$	$6\frac{1}{4}$	
$\frac{1}{2}$	2.90	7.25	8	$3\frac{1}{2}$		$\frac{1}{2}$	6.95	21.50	$12\frac{1}{8}$	$6\frac{1}{4}$	
$\frac{5}{8}$	3.00	7.75	8	$3\frac{1}{2}$		$\frac{5}{8}$	7.20	21.50	13	$6\frac{1}{4}$	
$\frac{3}{4}$	3.10	7.75	$8\frac{3}{8}$	$4\frac{1}{8}$		$\frac{3}{4}$	7.45	23.25	13	$6\frac{1}{4}$	
$\frac{7}{8}$	3.25	8.50	$8\frac{3}{8}$	$4\frac{1}{8}$		$\frac{7}{8}$	7.70	23.25	$13\frac{1}{8}$	$6\frac{1}{2}$	
1	3.35	8.50	$8\frac{1}{2}$	$4\frac{1}{8}$		1	7.90	25.00	$13\frac{1}{8}$	$6\frac{1}{2}$	
$1\frac{1}{8}$	3.55	9.50	$8\frac{1}{2}$	$4\frac{1}{8}$		$1\frac{1}{8}$	8.15	25.00	$13\frac{1}{8}$	$6\frac{1}{2}$	
$1\frac{1}{4}$	3.70	9.50	$9\frac{1}{8}$	$4\frac{1}{8}$		$1\frac{1}{4}$	8.40	26.75	$13\frac{1}{8}$	$6\frac{1}{2}$	
$1\frac{1}{2}$	3.90	10.50	$9\frac{1}{8}$	$4\frac{1}{8}$		$1\frac{1}{2}$	8.65	26.75	$13\frac{1}{8}$	$6\frac{1}{2}$	
$1\frac{3}{4}$						$1\frac{3}{4}$	8.90	28.50	$13\frac{1}{8}$	$6\frac{1}{2}$	
2					No. 3	2	9.10	28.50	$13\frac{1}{2}$	$6\frac{3}{4}$	No. 5
$2\frac{1}{8}$	4.10	10.50	10	$5\frac{1}{8}$		$2\frac{1}{8}$	9.35	30.50	$13\frac{1}{2}$	$6\frac{3}{4}$	
$2\frac{1}{4}$	4.25	11.50	10	$5\frac{1}{8}$		$2\frac{1}{4}$	9.60	30.50	$14\frac{1}{8}$	$6\frac{3}{4}$	
$2\frac{1}{2}$	4.45	11.50	$10\frac{3}{8}$	$5\frac{1}{8}$		$2\frac{1}{2}$	9.85	32.50	$14\frac{1}{8}$	$6\frac{3}{4}$	
$2\frac{3}{4}$	4.60	12.50	$10\frac{3}{8}$	$5\frac{1}{8}$		$2\frac{3}{4}$					
3	4.80	12.50	$10\frac{3}{8}$	$5\frac{1}{8}$		3	10.10	32.50	$14\frac{1}{8}$	$6\frac{3}{4}$	
$3\frac{1}{8}$	5.00	13.75	$10\frac{5}{8}$	$5\frac{1}{8}$		$3\frac{1}{8}$	10.30	34.50	$14\frac{1}{8}$	$6\frac{3}{4}$	
$3\frac{1}{4}$	5.15	13.75	$10\frac{7}{8}$	$5\frac{1}{8}$		$3\frac{1}{4}$	10.55	34.50	15	7	
$3\frac{1}{2}$	5.35	15.25	$10\frac{7}{8}$	$5\frac{1}{8}$		$3\frac{1}{2}$	10.80	36.75	15	7	
$3\frac{3}{4}$	5.50	15.25	$11\frac{1}{8}$	6		$3\frac{3}{4}$	11.05	36.75	15	7	
4	5.70	16.75	$11\frac{1}{8}$	6		4	11.30	39.00	15	7	
$4\frac{1}{8}$	5.90	16.75	$12\frac{1}{8}$	$6\frac{1}{8}$		$4\frac{1}{8}$					
$4\frac{1}{4}$	6.05	18.25	$12\frac{1}{8}$	$6\frac{1}{8}$		$4\frac{1}{4}$					

MORSE TAPER REAMERS

FOR REAMING DRILL SOCKETS, SPINDLES, ETC.



ROUGHING REAMER
NO. 125A—CARBON STEEL



FINISHING REAMER
NO. 125—CARBON STEEL

No.	Price Each		Length Over All Inches	Length Flute Inches	Diam. Small End	Diam. Large End	Taper per Foot
	Finishing	Roughing					
0	\$1.60	\$1.90	$3\frac{3}{4}$	$2\frac{1}{4}$	.250	.367	.625
1	2.00	2.40	$5\frac{1}{2}$	3	.367	.517	.600
2	2.60	3.10	$6\frac{3}{4}$	$3\frac{1}{2}$	.569	.745	.602
3	3.40	4.10	$7\frac{3}{4}$	$4\frac{1}{4}$	.775	.988	.602
4	4.20	5.05	$8\frac{7}{8}$	$5\frac{1}{4}$	1.017	1.289	.623
5	6.60	7.90	$10\frac{1}{2}$	$6\frac{1}{4}$	1.471	1.799	.630
6	12.00	14.40	12	$8\frac{1}{2}$	2.112	2.555	.626
7	35.00	42.00	16	12	2.746	3.371	.625

Standard and Morse Tapers are the same.

All sizes and dimensions not listed are special and subject to special prices.

HIGH SPEED REAMERS FURNISHED TO ORDER AT SPECIAL PRICES

FIG. 132

FIG. 133

TAPER PIN REAMERSSPIRAL FLUTES—TAPER $\frac{1}{4}$ INCH PER FOOT

NO. 405—CARBON STEEL



FIG. 3813

Number	Price Each		Diameter Small End Inches	Length Over All Inches	Length of Flutes Inches	Number	Price Each		Diameter Small End Inches	Length Over All Inches	Length of Flutes Inches
	Straight Flutes	Spiral Flutes					Straight Flutes	Spiral Flutes			
000	\$1.50	....	.1028	2 $\frac{1}{8}$	1 $\frac{1}{4}$	7	\$2.50	\$ 3.00	.331	6 $\frac{1}{4}$	4 $\frac{1}{8}$
00	1.35	....	.1124	2 $\frac{3}{8}$	1 $\frac{1}{2}$	8	3.00	3.60	.3983	7 $\frac{1}{4}$	5 $\frac{1}{4}$
0	1.00	\$1.20	.135	2 $\frac{1}{2}$	1 $\frac{5}{8}$	9	3.50	4.20	.4816	8 $\frac{1}{8}$	6 $\frac{1}{8}$
1	1.00	1.20	.146	2 $\frac{3}{4}$	1 $\frac{7}{8}$	10	4.50	5.40	.5810	9 $\frac{1}{2}$	7
2	1.25	1.50	.162	3 $\frac{1}{8}$	1 $\frac{9}{8}$	11	....	7.20	.7060	11 $\frac{1}{4}$	8 $\frac{1}{4}$
3	1.50	1.80	.183	3 $\frac{1}{4}$	2 $\frac{1}{8}$	12	....	9.00	.8420	13 $\frac{3}{8}$	10
4	1.75	2.10	.208	3 $\frac{7}{8}$	2 $\frac{3}{8}$	13	....	10.80	1.0090	16	12
5	2.00	2.40	.240	4 $\frac{1}{8}$	2 $\frac{7}{8}$	14	....	13.20	1.2500	18 $\frac{1}{4}$	14
6	2.25	2.70	.279	5 $\frac{1}{8}$	3 $\frac{5}{8}$						

TAPER PIN REAMERSSTRAIGHT FLUTES—TAPER $\frac{1}{4}$ INCH PER FOOT

NO. 126—CARBON STEEL



FIG. 104

These Reamers have the same taper, and each will overlay in convenient measure the size next smaller. The diameter is taken at extreme end. Special sizes made to order.

Number	Price Each	Diameter Small End	Length Flute Inches	Length Over All Inches	Number	Price Each	Diameter Small End	Length Flute Inches	Length Over All Inches
00	\$1.35	.114	1 $\frac{1}{2}$	2 $\frac{1}{4}$	7	\$ 2.50	.331	4 $\frac{1}{2}$	6
0	1.00	.135	1 $\frac{1}{2}$	2 $\frac{1}{4}$	8	3.00	.398	5 $\frac{1}{4}$	6 $\frac{3}{4}$
1	1.00	.146	1 $\frac{3}{4}$	2 $\frac{1}{2}$	9	3.50	.482	6 $\frac{1}{8}$	8
2	1.25	.162	2	3	10	4.50	.581	7	9
3	1.50	.183	2 $\frac{1}{4}$	3 $\frac{1}{2}$	11	6.00	.706	8 $\frac{1}{4}$	11 $\frac{1}{4}$
4	1.75	.208	2 $\frac{1}{2}$	4	12	7.50	.842	10	13 $\frac{3}{8}$
5	2.00	.240	3	4 $\frac{1}{2}$	13	9.00	1.009	12	16
6	2.25	.279	3 $\frac{5}{8}$	5	14	11.00	1.250	14	18 $\frac{1}{4}$

All sizes, dimensions and styles not listed are special and subject to special prices.

TAPER REAMERS

BIT BRACE SHANK—SPIRAL FLUTED



NO. 460—FIG. 135

Each reamer is approximately $\frac{1}{32}$ " larger at the largest cutting diameter than the nominal size. The point of each reamer will enter the hole reamed by next smaller size.

Size	Price	Length Flute Inches	Total Length Inches	Size	Price	Length Flute Inches	Total Length Inches
$\frac{1}{8}$	\$0.60	$1\frac{5}{8}$	$3\frac{5}{8}$	$\frac{11}{16}$	\$1.10	$2\frac{7}{8}$	$6\frac{1}{4}$
$\frac{1}{8}$	.60	$1\frac{3}{4}$	$3\frac{3}{4}$	$\frac{3}{4}$	1.25	$2\frac{7}{8}$	$6\frac{1}{4}$
$\frac{1}{4}$	.60	$1\frac{7}{8}$	$4\frac{1}{8}$	$\frac{13}{16}$	1.50	$3\frac{1}{8}$	$6\frac{1}{4}$
$\frac{1}{4}$	.60	$2\frac{1}{8}$	$4\frac{1}{8}$	$\frac{1}{2}$	1.75	$3\frac{1}{8}$	$6\frac{1}{4}$
$\frac{3}{8}$	.65	$2\frac{1}{8}$	$4\frac{1}{8}$	$\frac{1}{2}$	2.00	$3\frac{3}{8}$	7
$\frac{1}{2}$	.70	$2\frac{3}{8}$	$4\frac{1}{8}$	1	2.25	$3\frac{3}{8}$	7
$\frac{1}{2}$	.75	$2\frac{1}{2}$	$5\frac{1}{8}$	$1\frac{1}{8}$	2.85	$3\frac{5}{8}$	$7\frac{1}{4}$
$\frac{3}{4}$	.80	$2\frac{3}{4}$	$5\frac{1}{8}$	$1\frac{1}{4}$	3.55	$3\frac{5}{8}$	$7\frac{1}{2}$
$\frac{5}{8}$	.95	$2\frac{3}{4}$	$5\frac{1}{8}$				

REAMERS IN SETS

IN HARDWOOD CASES



FIG. 103

Prices include cases.

Our Reamer Cases are made of selected oak, highly polished. The fillers are so constructed that each Reamer rests in a separate groove, thus preventing any injury to the cutting edges.



FIG. 102

HAND

Set No. 1— $\frac{1}{4}$ inch to 1 inch by 16ths, thirteen Hand Reamers.....	\$ 33.00
Set No. 2— $\frac{1}{4}$ inch to $1\frac{1}{4}$ inch, by 16ths, seventeen Hand Reamers.....	53.00
Set No. 3— $\frac{1}{4}$ inch to $1\frac{1}{2}$ inch, by 16ths, twenty-one Hand Reamers.....	78.50
Set No. 4— $\frac{1}{4}$ inch to 2 inch, by 16ths, twenty-nine Hand Reamers.....	150.00
Set No. 5— $\frac{1}{4}$ inch to 1 inch, by 32nds, twenty-five Hand Reamers.....	64.00
Set No. 6— $\frac{1}{4}$ inch to $1\frac{1}{4}$ inch, by 32nds, thirty-three Hand Reamers.....	102.50
Set No. 7— $\frac{1}{4}$ inch to $1\frac{1}{2}$ inch, by 32nds, forty-one Hand Reamers.....	153.00
Set No. 8— $\frac{1}{4}$ inch to 2 inch, by 32nds, fifty-seven Hand Reamers.....	295.00

Self-feeding Reamers or Reamers with spiral flutes can be furnished in sets if desired. Prices on application.

TAPER PIN WITH STRAIGHT FLUTES

These Reamers have a taper of $\frac{1}{4}$ inch per foot and each will overlay the size next smaller.

Set No. 9—No. 0 to No. 10, eleven Reamers.....	\$26.50
Set No. 9 $\frac{1}{2}$ —No. 0 to No. 5, six Reamers.....	9.50

TAPER PIN WITH SPIRAL FLUTES

These Reamers have a taper of $\frac{1}{4}$ -inch per foot and each will overlay the size next smaller.

Set No. 1420—6 sizes, Nos. 0, 1, 2, 3, 4, 5.....	\$11.25
Set No. 1421—11 sizes, Nos. 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10.....	30.00

MORSE TAPER

Set No. 10—No. 1 to No. 5, five Reamers.....	\$20.50
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BIT STOCK TAPER

Set No. 11— $\frac{1}{4}$ inch to $\frac{3}{4}$ inch, by 16ths, nine Reamers...	\$8.25
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TAPER PIPE REAMERS

Sizes not listed are special.



NO. 480—FIG. 129

Size	Price Each	Size	Price Each	Size	Price Each
$\frac{1}{8}$	\$1.00	$\frac{1}{2}$	\$2.00	$1\frac{1}{4}$	\$ 5.00
$\frac{1}{4}$	1.20	$\frac{3}{4}$	2.80	$1\frac{1}{2}$	6.60
$\frac{3}{8}$	1.60	1	4.40	2	10.00

SPECIAL REAMERS

FOR REPAIRS ON FORD CARS

PISTON PIN BUSHING

NO. 1425—FIG. 127

Used for reaming through both the piston pin bushings for perfect alignment of piston pins. Price, each..... \$1.75

SPINDLE BODY AND SPINDLE ARM BUSHING

A 2-in-1 reamer for front axle bushings. The 5-inch section reams the spindle body bushings in perfect alignment at one operation.

The 1-inch section is for use in the spindle arm bushing. Price each..... \$2.50



NO. 1424—FIG. 122

THREE-IN-ONE CRANK-SHAFT

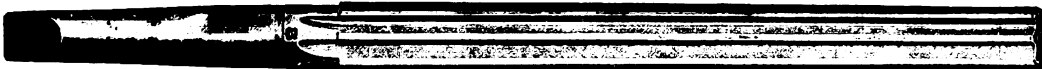
No. 3031-2-3 Crank shaft or main bearing bushing reamer. This reamer is designed to ream the three bushings for the crank shaft at one operation and obtain perfect alignment of these bearings. This tool saves a great deal of time in accomplishing this work and is constructed in such a way that it is easily operated..... \$22.50



FIG. 128

TAPER SHANK TAPER REAMERS FOR LOCOMOTIVE WORK

TAPER 1-16 INCH PER FOOT



NO. 127A—CARBON STEEL

FIG. 134

NO. 783—HIGH SPEED STEEL

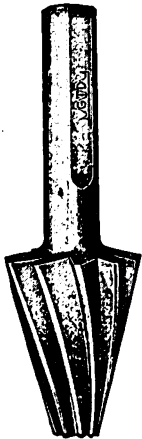
Diam. at End In.	Price Each		Length Over All Inches	Length Flute Inches	Taper Shank	Diam. at End Inches	Price Each		Length Over All Inches	Length Flute Inches	Taper Shank
	Carbon Steel	High Speed					Carbon Steel	High Speed			
1/4	\$3.10	\$ 6.00	7 1/8	4	No. 1	1 1/8	\$ 6.60	\$17.00	13 1/2	9	No. 3
3/8	3.10	6.25	7 1/8	4		1 1/8	6.80	18.50	14 1/2	10	
1/2	3.15	6.50	7 1/8	4		1 1/8	7.25	20.00	14 1/2	10	
5/8	3.15	6.75	7 1/8	4		1 1/4	7.70	22.00	15 1/2	10	
3/4	3.20	7.00	8 1/8	5		1 1/4	8.35	24.00	17 1/2	12	
7/8	3.25	7.25	8 1/8	5		1 1/2	8.80	26.00	17 1/2	12	No. 4
1	3.30	7.50	9 1/8	6		1 1/2	9.35	28.00	17 1/2	12	
1 1/8	3.45	7.75	9 1/8	6		1 1/2	9.90	30.00	17 1/2	12	
1 1/4	3.50	8.00	10 1/8	7		1 1/2	10.55	32.50	19 1/2	14	
1 1/2	3.50	8.75	11 1/8	8		1 1/2	11.20	35.00	19 1/2	14	
1 3/4	4.00	9.50	11 1/8	8	No. 2	1 1/2	11.95	38.00	19 1/2	14	No. 5
2	4.50	10.25	11 1/8	8		1 3/4	12.75	41.00	20 3/4	14	
2 1/8	4.90	11.00	11 1/8	8		1 3/4	13.65	44.00	22 3/4	16	
2 1/4	5.30	12.00	12 1/8	9		1 3/4	14.60	47.00	22 3/4	16	
2 1/2	5.70	13.00	12 1/8	9		1 3/4	15.70	51.00	22 3/4	16	
2 3/4	6.05	14.00	13 1/2	9	No. 3	2	16.80	55.00	22 3/4	16	
3	6.40	15.50	13 1/2	9							

Reamers of other taper per foot, length of flute, etc., than specified above, made to order. Prices on application.

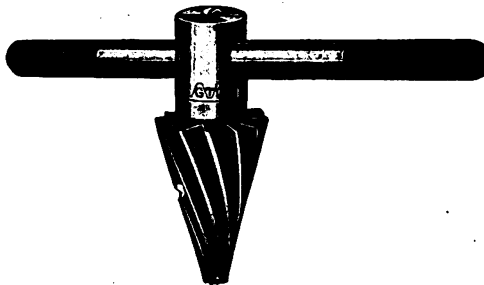
SPECIFY ALL TOOLS BY OUR LIST NUMBERS

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BURRING REAMERS



NO. 243
FIG. 124



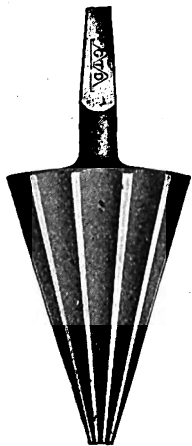
NOS. 245, 246—FIG. 123

These Burring Reamers are made of finest steel and designed especially for removing burrs from pipe, caused by cutting. They are also extensively used for countersinking.

Great care is taken in grinding these tools to adapt them for use in a variety of materials.



NOS. 241, 242,
242½, 244—FIG. 126



NOS. 1 & 2—FIG. 4021

No.	Price Each	Price per Doz.	Style of Shank	Capacity Pipe Inches
241	\$1.00	\$12.00	Bit Brace	1/8 to 1/2
242	1.25	14.00	Bit Brace	1/8 to 1
242½	1.50	17.00	Bit Brace	1/4 to 1¼
243	1.50	17.00	½ Round	1/4 to 1¼
244	3.00	36.00	Bit Brace	1/4 to 2
246	4.00	48.00	T Handle	1/4 to 2
1	1.50	17.00	Bit Brace	1/4 to 1¼
2	3.00	36.00	Bit Brace	1/4 to 2

Please order by number.

CENTER REAMERS

Size Cut Inches	Diameter Shank Inches	Price, Style No. A		Price, Style No. B	
		Each	Per Doz.	Each	Per Doz.
1/4	3/16	\$0.25	\$3.00	\$0.30	\$ 3.60
3/8	1/4	.30	3.60	.35	4.20
1/2	5/16	.35	4.20	.40	4.80
5/8	3/8	.60	7.20	.65	7.80
3/4	1/2	.80	9.60	.85	10.20



STYLE A—FIG. 138
NO. 128B—CARBON STEEL



STYLE B—FIG. 139
NO. 128B—CARBON STEEL

Included angle 60°.

We will furnish Center Reamers when desired with include angle of 72° or 82° at regular list prices. Other sizes and angle made to order.

Orders for less than 1/2 dozen Center Reamers of a size will be filled at single tool prices.

COUNTERSINKS

FOR BOLTS 54 DEG. AND SCREWS 82 DEG.



FIG. 137

Stocked in three styles of shank, Bit Brace, $\frac{1}{2}$ " Round and $\frac{1}{4}$ " Round. Order by number.

No.	Price		Style Shank	Cut	
	Each	Per Dozen		Dia. Inches	Angle Degree
501	\$.50	\$5.75	Bit Brace $\frac{1}{2}$ " Round $\frac{1}{4}$ " Round	$\frac{5}{8}$	54°
502					
503					
504	.50	5.75	Bit Brace $\frac{1}{2}$ " Round $\frac{1}{4}$ " Round	$\frac{5}{8}$	82°
505					
506					
507	.75	8.50	Bit Brace $\frac{1}{2}$ " Round $\frac{1}{4}$ " Round	$\frac{3}{4}$	54°
508					
509					
511	.75	8.50	Bit Brace $\frac{1}{2}$ " Round $\frac{1}{4}$ " Round	$\frac{3}{4}$	82°
512					
513					

DRILL AND COUNTERSINK

COMBINED



FIG. 140

NO. 107D—CARBON STEEL

NO. 779 HIGH SPEED STEEL

Angle of Countersink 60°.

Size	Diameter of Body	Diameter of Drill	Price Per Dozen	
			Carbon Steel	High Speed
A	$\frac{3}{10}$	$\frac{3}{8}$ and $\frac{1}{8}$	\$2.75	\$6.00
B	$\frac{3}{10}$	$\frac{1}{2}$ " $\frac{1}{8}$	2.75	6.00
C	$\frac{3}{10}$	$\frac{3}{4}$ " $\frac{3}{8}$	2.75	6.00
D	$\frac{3}{10}$	No. 49 " No. 45	2.50	6.00
E	$\frac{1}{2}$	$\frac{1}{2}$ " No. 45	2.25	6.00
F	$\frac{1}{2}$	$\frac{3}{4}$ " $\frac{3}{8}$	3.50	9.00
G	$\frac{1}{2}$	$\frac{1}{2}$ " $\frac{1}{8}$	3.50	9.00
H	$\frac{1}{2}$	$\frac{3}{4}$ " $\frac{3}{8}$	3.50	9.00
I	$\frac{1}{2}$	$\frac{1}{2}$ " $\frac{1}{8}$	2.25	6.00
J	$\frac{1}{2}$	No. 57 " No. 57	2.00	6.00
K	$\frac{1}{2}$	No. 55 " No. 55	2.25	6.00
L	$\frac{1}{2}$	No. 45 " No. 45	2.50	6.00

QUICK CUTTING COUNTERBORES AND COUNTERSINKS

FIG. 142

ROUND AND FILISTER—FOR MACHINE SCREWS



FIG. 142 1/2

FOR FLAT HEAD MACHINE SCREWS

PRICE LIST, EACH

Filister Heads,	2, 3, 4, 5, 6,	\$0.40
" "	7, 8, 9, 10, 12, 14,	.50
Flat Heads	2, 4, 6,	.40
" "	8, 10,	.50

COMPLETE SETS

Complete set of 16 as per list in neat wood box with cover, price	\$7.40
Set of 12 in box including 2, 4, 6, 8, 10, 12, 14 filister head 2, 4, 6, 8, 10 flat head	\$5.60

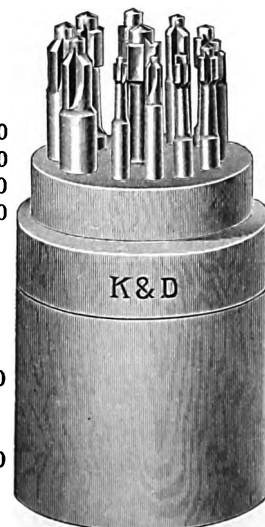


FIG. 143

These tools may be sharpened by grinding, and having multiple cutting edges, are very durable.

COUNTERBORES

WITH TAPER SHANKS

NO. 130B—CARBON STEEL

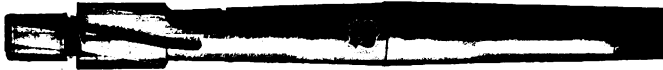


FIG. 141

No. 1 Head Counterbore has diameter of cutter equal to diameter of head of screw, and diameter of guide equal to diameter of body of screw.

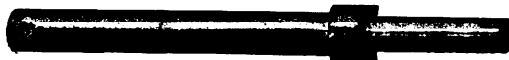
No. 2 Head Counterbore has diameter of cutter equal to diameter of head of screw, and diameter of guide equal to diameter of tap drill for screw.

Furnished either singly or in sets, consisting of one Counterbore for head of screw with guide of body size, one Counterbore for head with guide of tap drill size, and one Counterbore to enlarge a tap drill hole to body size.

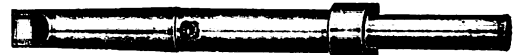
Counterbores of other sizes made to order.

Diam. of Screw and Pitch U. S. Stand'rd	Price Each Carbon Steel	Diam. of Counter-bore, In. For Hd. of Screw	Diam. of Guide Inches		Length Over All Inches	Taper Shank
			No. 1 Head	No. 2 Head		
$\frac{1}{16}$ 24	\$1.75	$\frac{1}{4}$	$\frac{3}{16}$.135	$5\frac{1}{2}$	No. 1
$\frac{1}{4}$ 20	2.00	$\frac{3}{8}$	$\frac{1}{4}$	.1865	$5\frac{3}{4}$
$\frac{1}{8}$ 18	2.10	$\frac{1}{2}$	$\frac{5}{16}$	.241	$6\frac{1}{8}$
$\frac{3}{8}$ 16	2.35	$\frac{1}{2}$	$\frac{3}{8}$	.301	$6\frac{1}{2}$
$\frac{1}{8}$ 14	2.55	$\frac{5}{8}$	$\frac{7}{16}$.347	7	No. 2
$\frac{1}{2}$ 13	2.85	$\frac{3}{4}$	$\frac{1}{2}$	.4057	$7\frac{1}{4}$
$\frac{1}{2}$ 12	3.10	$\frac{1}{2}$	$\frac{1}{2}$	.452	$7\frac{1}{2}$
$\frac{5}{8}$ 11	3.30	$\frac{7}{8}$	$\frac{5}{8}$	.5146	$7\frac{3}{4}$
$\frac{1}{8}$ 11	3.55	$\frac{1}{2}$	$\frac{1}{2}$.5771	$8\frac{1}{2}$	No. 3
$\frac{3}{4}$ 10	3.85	1	$\frac{3}{4}$	.624	9
$\frac{1}{2}$ 10	4.15	$1\frac{1}{8}$	$\frac{3}{4}$	.6865	9
$\frac{1}{8}$ 9	4.40	$1\frac{1}{8}$	$\frac{1}{2}$	.7333	$9\frac{1}{4}$
$\frac{1}{8}$ 9	4.95	$1\frac{1}{4}$	$\frac{1}{2}$	.7958	$9\frac{1}{4}$
1 8	5.50	$1\frac{1}{4}$	1	.8427	$9\frac{1}{2}$	

ARBORS FOR SHELL REAMERS



STRAIGHT SHANK—NO. 130—FIG. 118



TAPER SHANK—NO. 130½—FIG. 119

Number	Price Each	Fitting Sizes	Length Over All Inches	Number	Price Each	Fitting Sizes	Length Over All Inches	Taper Shank
3	\$ 2.40	$\frac{1}{2}$ to $\frac{1}{8}$	8	3	\$ 2.90	$\frac{1}{2}$ to $\frac{1}{8}$	8	No. 1
4	2.70	$\frac{5}{8}$ " $\frac{1}{4}$	9	4	3.25	$\frac{5}{8}$ " $\frac{1}{4}$	9	" 2
5	3.00	$\frac{3}{4}$ " $\frac{1}{2}$	$9\frac{1}{2}$	5	3.60	$\frac{3}{4}$ " $\frac{1}{2}$	$9\frac{1}{2}$	" 3
6	3.30	1 " $\frac{3}{4}$	10	6	3.95	1 " $\frac{3}{4}$	10	" 2
7	3.60	$1\frac{1}{8}$ " $1\frac{1}{4}$	11	7	4.30	$1\frac{1}{8}$ " $1\frac{1}{4}$	11	" 3
8	4.00	$1\frac{1}{4}$ " $2\frac{1}{4}$	12	8	4.80	$1\frac{1}{4}$ " $2\frac{1}{4}$	12	" 4
9	4.50	$2\frac{1}{8}$ " $2\frac{1}{2}$	13	9	5.40	$2\frac{1}{8}$ " $2\frac{1}{2}$	13	" 4
10	5.25	$2\frac{1}{4}$ " $3\frac{1}{4}$	14	10	6.30	$2\frac{1}{4}$ " $3\frac{1}{4}$	14	" 5
11	7.50	$3\frac{1}{8}$ " $3\frac{1}{2}$	15	11	9.00	$3\frac{1}{8}$ " $3\frac{1}{2}$	15	" 5
12	10.50	$3\frac{1}{4}$ " $4\frac{1}{2}$	16	12	12.60	$3\frac{1}{4}$ " $4\frac{1}{2}$	16	" 5
13	13.50	$4\frac{1}{8}$ " $4\frac{1}{2}$	17	13	16.20	$4\frac{1}{8}$ " $4\frac{1}{2}$	17	" 5
14	18.00	$4\frac{5}{8}$ " $5\frac{1}{2}$	18	14	21.60	$4\frac{5}{8}$ " $5\frac{1}{2}$	18	" 5
15	22.00	$5\frac{3}{8}$ " 6	19	15	26.40	$5\frac{3}{8}$ " 6	19	" 6

SHELL REAMERS

FLUTED

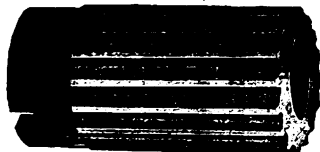


FIG. 105

ROSE



FIG. 106

NO. 123—CARBON STEEL

NO. 615 HIGH SPEED STEEL

NO. 123½ CARBON STEEL

NO. 616—HIGH SPEED STEEL

Diam. In.	Price Each		Length Over All Inches	Diam. Hole Large End Inches	Fitting Arbor Number	Diam. In.	Price Each		Length Over All Inches	Diam. Hole Large End Inches	Fitting Arbor Number
	Carbon Steel	High Speed					Carbon Steel	High Speed			
½	\$1.70	\$ 3.25	2	¼	3	1 1/8	\$ 6.00	\$12.00	3 1/2	1	8
5/8	1.80	3.40	2	¼	3	1 1/8	6.00	12.00	3 1/2	1	8
¾	1.80	3.40	2	¼	3	1 1/8	6.30	12.75	3 1/2	1	8
7/8	1.90	3.55	2	¼	3	1 1/8	6.30	12.75	3 1/2	1	8
1	1.90	3.55	2 1/4	3/8	4	1 1/8	6.60	13.50	3 1/2	1	8
1 1/8	2.00	3.70	2 1/4	3/8	4	2	6.60	13.50	3 1/2	1	8
1 1/4	2.00	3.70	2 1/4	3/8	4	2 1/8	6.95	14.25	3 3/4	1 1/4	9
1 1/2	2.10	3.85	2 1/4	3/8	4	2 1/8	7.30	15.00	3 3/4	1 1/4	9
1 3/4	2.10	3.85	2 1/2	1/2	5	2 1/8	7.65	15.75	3 3/4	1 1/4	9
2	2.20	4.00	2 1/2	1/2	5	2 1/8	8.00	16.50	3 3/4	1 1/4	9
2 1/8	2.20	4.00	2 1/2	1/2	5	2 1/8	8.35	17.25	3 3/4	1 1/4	9
2 1/4	2.30	4.25	2 1/2	1/2	5	2 1/8	8.70	18.00	3 3/4	1 1/4	9
2 1/2	2.30	4.25	2 1/2	1/2	5	2 1/8	9.05	18.75	3 3/4	1 1/4	9
2 3/4	2.40	4.50	2 1/2	1/2	5	2 1/8	9.40	19.50	3 3/4	1 1/4	9
3	2.40	4.50	2 1/2	1/2	5	2 1/8	9.80	20.50	4	1 1/2	10
3 1/8	2.50	4.75	2 1/2	1/2	5	2 1/8	10.20	21.75	4	1 1/2	10
3 1/4	2.50	4.75	2 3/4	5/8	6	2 1/8	10.60	23.00	4	1 1/2	10
3 1/2	2.70	5.00	2 3/4	5/8	6	2 1/8	11.00	24.25	4	1 1/2	10
3 3/4	2.70	5.00	2 3/4	5/8	6	2 1/8	11.40	25.50	4	1 1/2	10
4	2.90	5.25	2 3/4	5/8	6	2 1/8	11.80	27.00	4	1 1/2	10
4 1/8	2.90	5.25	2 3/4	5/8	6	3	12.20	28.50	4	1 1/2	10
4 1/4	3.10	5.50	2 3/4	5/8	6	3	12.60	30.00	4	1 1/2	10
4 1/2	3.10	5.50	2 3/4	5/8	6	3 1/8	13.10	31.50	4 1/2	1 3/4	11
4 3/4	3.30	5.75	2 3/4	5/8	6	3 1/8	13.60	33.25	4 1/2	1 3/4	11
5	3.30	5.75	2 3/4	5/8	6	3 1/8	14.10	35.25	4 1/2	1 3/4	11
5 1/8	3.55	6.00	2 3/4	5/8	6	3 1/4	14.60	37.50	4 1/2	1 3/4	11
5 1/4	3.55	6.00	3	3/4	7	3 1/4	15.10	40.00	4 1/2	1 3/4	11
5 1/2	3.80	6.50	3	3/4	7	3 1/4	15.60	42.50	4 1/2	1 3/4	11
5 3/4	3.80	6.50	3	3/4	7	3 1/4	16.10	45.25	4 1/2	1 3/4	11
6	4.05	7.00	3	3/4	7	3 1/2	16.60	48.00	4 1/2	1 3/4	11
6 1/8	4.05	7.00	3	3/4	7	3 1/2	17.20	50.75	5	2	12
6 1/4	4.30	7.50	3	3/4	7	3 1/2	17.80	53.50	5	2	12
6 1/2	4.30	7.50	3	3/4	7	3 1/2	18.40	56.50	5	2	12
6 3/4	4.55	8.25	3	3/4	7	3 1/2	19.00	59.50	5	2	12
7	4.55	8.25	3	3/4	7	3 1/2	19.60	62.75	5	2	12
7 1/8	4.80	9.00	3	3/4	7	3 1/2	20.20	66.00	5	2	12
7 1/4	4.80	9.00	3	3/4	7	3 1/2	20.80	69.25	5	2	12
7 1/2	5.10	9.75	3	3/4	7	4	21.40	72.50	5	2	12
7 3/4	5.10	9.75	3 1/2	1	8						
8	5.40	10.50	3 1/2	1	8						
8 1/8	5.40	10.50	3 1/2	1	8						
8 1/4	5.70	11.25	3 1/2	1	8						
8 1/2	5.70	11.25	3 1/2	1	8						

All sizes and dimensions not listed are special and subject to special prices.

ROSE CHUCKING REAMERS

WITH TAPER SHANKS

NO. 124C—CARBON STEEL



NO. 621—HIGH SPEED STEEL

FIG. 130

Diam. In.	Price Each		Length Over All Inches	Length of Flute Inches	Taper Shank	Diam. In.	Price Each		Length Over All Inches	Length of Flute Inches	Taper Shank
	Carbon Steel	High Speed					Carbon Steel	High Speed			
1/4	\$1.45	\$ 3.50	6	1 1/2	No. 1	1/4	\$3.90	\$10.00	10	2 5/8	No. 3
5/16	1.55	3.75	6	1 1/2		5/16	4.15	11.00	10	2 5/8	
3/8	1.55	3.75	6	1 1/2		3/8	4.15	11.00	10 1/2	2 3/4	
7/16	1.75	4.25	6	1 1/2		7/16	4.45	12.25	10 1/2	2 3/4	
1/2	1.75	4.25	7	1 3/4		1/2	4.45	12.25	10 1/2	2 3/4	
9/16	1.90	4.75	7	1 3/4		9/16	4.70	13.50	10 1/2	2 3/4	
5/8	1.90	4.75	7	1 3/4		5/8	4.70	13.50	11	2 3/4	
3/4	2.15	5.25	7	1 3/4		3/4	5.00	14.75	11	2 3/4	
7/8	2.15	5.25	8	2		7/8	5.00	14.75	11	2 3/4	
1	2.40	5.75	8	2		1	5.20	16.25	11 1/2	3	
1 1/16	2.40	5.75	8	2	No. 2	1 1/16	5.20	16.25	11 1/2	3	No. 4
1 1/8	2.70	6.25	9	2 1/4		1 1/8	5.50	18.00	11 1/2	3	
1 1/4	2.70	6.25	9	2 1/4		1 1/4	5.75	19.75	12	3 1/4	
1 3/8	2.90	6.75	9	2 1/4		1 3/8	6.05	21.50	12	3 1/4	
1 1/2	2.90	6.75	9	2 1/4		1 1/2	6.30	23.25	12 1/2	3 1/2	
1 5/8	3.05	7.25	9	2 1/2		1 5/8	6.60	25.00	12 1/2	3 1/2	
1 3/4	3.05	7.25	9 1/2	2 1/2		1 3/4	6.90	26.75	13	3 3/4	
1 7/8	3.35	8.00	9 1/2	2 1/2		1 7/8	7.20	28.50	13	3 3/4	
2	3.35	8.00	9 1/2	2 1/2		2	7.55	30.50	13 1/2	4	
2 1/16	3.60	9.00	10	2 1/2		2 1/16	7.90	32.50	13 1/2	4	No. 5
2 1/8	3.60	9.00	10	2 5/8		2 1/8	8.30	34.50	14	4 1/4	
2 1/4	3.90	10.00	10	2 5/8		2 1/4	8.65	36.75	14	4 1/4	
2 3/8		2 3/8	9.00	39.00	14	4 1/4	

All sizes and dimensions not listed are special and subject to special prices. Also furnished in straight shank.

BRIDGE AND BOILER REAMERS

TAPER SHANKS

NO. 129A—CARBON
STEELNO. 627 HIGH SPEED
STEEL

FIG. 131

These Reamers are most generally used in pneumatic and electrical tools, on boiler, bridge, ship and general structural ironwork.

They are tapered on the end to facilitate entering the work, and we recommend them for exceptional strength and durability. Millimeter sizes made to order.

Full Diam. In.	Diam. at Point	Price Each		Length Tapered Part Inches	Length Over All Inches	Taper Shank	Full Diam. In.	Diam. at Point	Price Each		Length Tapered Part Inches	Length Over All Inches	Taper Shank
		Carbon Steel	High Speed						Carbon Steel	High Speed			
1/4	5/32	\$2.30	\$3.00	1 1/2	6 3/8	No. 1	7/8	1 1/16	\$3.75	\$5.70	3 1/2	12	No. 3
5/16	3/16	2.35	3.25	1 1/2	6 3/4		1 1/8	5/8	4.00	6.00	3 1/2	12	
3/8	1/8	2.40	3.25	1 1/2	6 3/4		1 1/4	1 1/8	4.25	6.50	3 1/2	12	
7/16	5/16	2.45	3.50	2	7 1/4		1 3/8	3/4	4.50	7.00	3 1/2	12	
1/2	3/8	2.50	3.50	2	7 1/4		1 1/2	7/8	4.75	7.50	3 1/2	12	
5/8	1/2					No. 2	1 5/8	1 1/2	5.00	8.00	3 1/2	12	No. 4
3/4	5/8	2.55	3.75	2	8 1/4		1 3/4	1 1/8	5.50	8.75	3 1/2	12	
7/8	3/4	2.60	3.75	2	8 1/4		1 7/8	1 1/16	6.00	9.50	3 1/2	13	
1	7/8	2.65	4.00	2 1/2	9		2	1 1/8	6.50	10.50	3 1/2	13	
1 1/16	1	2.75	4.00	2 1/2	9		2 1/16	1 1/8	7.00	12.00	3 1/2	13	
1 1/8	1 1/16	2.90	4.25	2 1/2	10	No. 3	2 1/8	1 1/4	8.00	14.00	3 1/2	13	
1 1/4	1 1/8	3.20	4.75	3 1/2	11 3/4								
1 1/2	1 1/4	3.35	5.00	3 1/2	12								
1 3/4	1 1/2	3.50	5.30	3 1/2	12								

All sizes, dimensions and styles not listed are special and subject to special prices.

STANDARD EXPANSION REAMERS

NO. 128D—CARBON STEEL

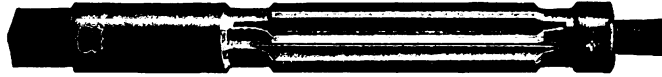


FIG. 121

Diam. In.	Price Each	Length Over All Inches	Length Flute Inches	Diam. Inches	Price Each	Length Over All Inches	Length Flute Inches	Diam. In.	Price Each	Length Over All Inches	Length Flute Inches	Diam. Inches	Price Each	Length Over All Inches	Length Flute Inches
1/4	\$3.00	3 3/8	1 1/4	3/4	\$4.60	6 1/8	2 1/4	1 3/8	\$10.50	10 1/2	4 1/4	1 7/8	\$15.50	12 1/4	5
1/2	3.05	4	1 3/4	7/8	4.80	6 3/4	2 3/4	1 7/8	11.50	10 7/8	4 3/4	1 7/8	16.00	12 3/8	5
3/4	3.10	4	1 3/4	1	5.00	7 1/4	3 1/4	1 7/8	12.50	11 1/8	4 1/2	2	16.50	12 3/4	5
1	3.15	4 1/4	1 3/4	1 1/8	5.25	7 1/2	3 1/2	1 7/8	13.00	11 1/4	4 1/2	2 1/8	17.50	12 3/4	5 1/8
1 1/4	3.20	4 1/4	1 3/4	1 1/4	5.50	7 1/2	3 1/2	1 7/8	13.50	11 1/2	4 1/2	2 1/4	18.50	13	5 1/8
1 1/2	3.25	4 1/2	1 3/4	1 1/2	5.75	7 1/2	3 1/2	1 7/8	14.00	11 5/8	4 1/2	2 3/8	19.50	13 1/2	5 1/4
1 3/4	3.30	4 1/2	1 3/4	1 3/4	6.00	7 3/8	3 1/2	1 7/8	14.50	11 3/4	5	2 1/2	20.50	14	5 3/8
2	3.35	5	1 1/2	1 3/4	6.25	7 3/8	3 1/2	1 7/8	15.00	12 1/8	5				
2 1/4	3.40	5	1 1/2	1 3/4	6.50	8 1/8	3 3/4	1 7/8							
2 1/2	3.50	5 1/2	2 1/8	1 3/4	6.75	8 3/8	3 3/4	1 7/8							
2 3/4	3.65	5 1/2	2 1/8	1 3/4	7.25	8 1/2	4	1 7/8							
3	3.80	6	2 1/2	1 1/2	7.75	9	4 1/8	1 7/8							
3 1/4	4.00	6	2 1/2	1 1/2	8.30	9 3/8	4 1/4	1 7/8							
3 1/2	4.20	6 1/4	2 1/2	1 1/2	8.90	9 3/4	4 3/8	1 7/8							
3 3/4	4.40	6 1/4	2 1/2	1 1/2	9.50	10 1/8	4 1/2	1 7/8							

All sizes and dimensions not listed are special and subject to special prices.

The maximum expansion for above Reamers is as follows:

Sizes	1/4 inch to 5/8 inch, .005
"	1/2 " to 1 " .008
"	1 1/8 " to 1 1/2 " .010
"	1 1/4 " to 2 " .012
"	2 1/8 " to 2 1/2 " .015

LIGHTNING ADJUSTABLE REAMERS

NO. 490

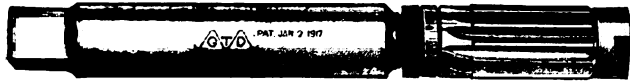


FIG. 3814

LANDS POSITIVELY SUPPORTED

The cut shows how the cutting lands are supported on conical shoulders at either end. They are prevented from twisting out of alignment or slipping around the body by splines fitting snugly along the center. The locknut and micrometer adjusting nut are made cup-shaped to receive the chamfered ends of the lands.

EXCEPTIONALLY LONG LIFE

The lands are made of a special alloy carbon or high speed steel and may be used indefinitely as the adjustment compensates for any reduction in size due to sharpening. All wearing parts are carefully hardened and ground.

WIDE ADJUSTMENT

The new Lightning Adjustable Reamer provides for a wide range of adjustment without distortion of the cutting lands and by a quick and easy method.

ALL LANDS ADJUSTED SIMULTANEOUSLY

In changing the adjustment all lands are released at one time by turning the locknut—it is not necessary to unlock each land separately. It is then but a moment's work to correct the adjustment by turning the fine threaded adjusting nut to the desired position. This nut has micrometer graduations making the adjustment both quick and positive.

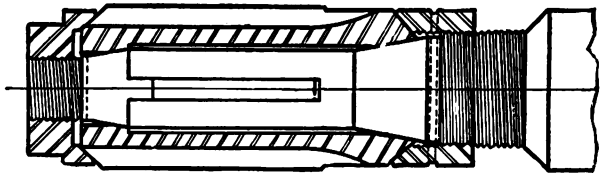


FIG. 3815

Diam- eter Inches	Price Each		Length Over All Inches	Length of Flute Inches	Diam- eter Inches	Price Each		Length Over All Inches	Length of Flute Inches
	Carbon Steel Blades	High Speed Steel Blades				Carbon Steel Blades	High Speed Steel Blades		
3/4	\$5.25	\$6.50	7 1/2	2 1/2	1 1/4	\$8.70	\$11.00	9 1/2	3
1	5.50	6.90	7 1/2	2 1/2	1 1/2	9.10	11.40	10 1/2	3 1/4
1 1/4	5.75	7.20	7 1/2	2 1/2	1 3/4	9.45	12.25	10 1/2	3 1/4
1 1/2	6.00	7.50	7 1/2	2 1/2	1 3/4	9.85	12.65	10 1/2	3 1/4
1 3/4	6.25	7.80	8 1/2	2 3/4	1 3/4	10.25	13.00	10 1/2	3 1/4
2	6.50	8.15	8 1/2	2 3/4	1 3/4	10.85	13.65	11 1/2	3 1/2
2 1/4	6.75	8.45	8 1/2	2 3/4	1 3/4	11.20	14.40	11 1/2	3 1/2
2 1/2	7.00	8.95	8 1/2	2 3/4	1 3/4	11.60	14.80	11 1/2	3 1/2
2 3/4	7.25	9.20	9 1/2	3	1 3/4	12.00	15.20	11 1/2	3 1/2
3	7.50	9.45	9 1/2	3	2	12.40	15.60	12 1/2	3 3/4
3 1/4	7.70	10.00	9 1/2	3					

"STANAR" ADJUSTABLE REAMERS

WITH CARBON AND HIGH SPEED STEEL BLADES

Modern practice has created a demand for a line of Reamers of simple construction, in which accuracy and rigidity are combined with easy adjustability to compensate for wear. In "StanaR" Adjustable Reamers, we offer tools which are successfully meeting this demand in actual service.

CONSTRUCTION

The bodies are made of tough machinery steel, and the blades are held in the slots with heavy screws. The heads of the screws are shaped to fit the "V" slots in the sides of the blades, and countersunk into the bodies.

This construction, shown graphically opposite, not only seats the blades solidly on the bottoms of the slots, but holds them to the backs of the slots as well. This overcomes the tendency of the blades to spring either upward or endwise.

The blades are unevenly spaced, which makes them cut smoothly and without chattering. They extend beyond the ends of the bodies a sufficient distance to permit grinding with end clearance, for chucking and machine reaming.

ADJUSTMENTS

To readjust the blades of "StanaR" Reamers for an increase in diameter or for regrinding, a liner of some suitable material must be used. We recommend either thin tinfoil or a thin, hard-surfaced paper such as light-weight bond.

The liner should be cut in strips of the proper width and length and placed in the bottoms of the slots, under the blades. The Reamer can then be reground to the desired size.

BLADES

"StanaR" Adjustable Reamers are furnished with either Carbon or High-Speed Steel blades. The two kinds are alike in sizes and all the slots in any body are exactly the same, which avoids the necessity of matching blades and slots. Carbon and

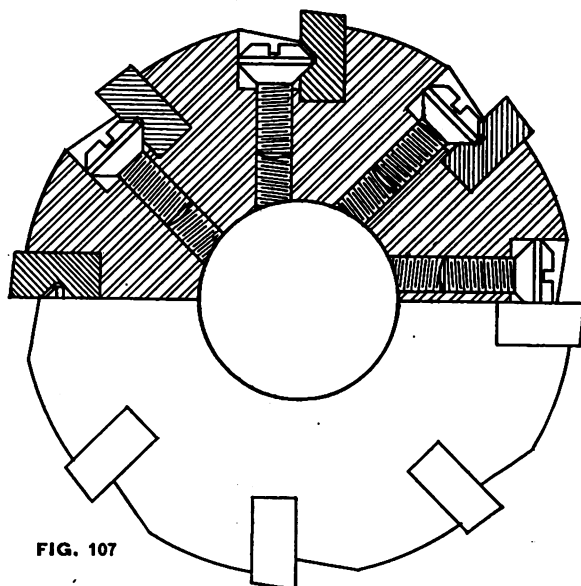


FIG. 107

CROSS SECTION VIEW, SHOWING CONSTRUCTION

High-Speed Steel blades can be interchanged in one body—a "StanaR" feature, exclusively.

The liberal width of the blades permits regrinding them many times before they are worn out. New blades of either kind can be furnished at any time, singly or in sets.

In ordering new blades, always specify the size and list number of the Reamer for which they are required, and state whether Carbon or High-Speed Steel blades are wanted.

"STANAR" ADJUSTABLE HAND REAMERS

NO. 123C—CARBON STEEL



NO. 660—HIGH SPEED STEEL

FIG. 108

Diameter Inches	Price Each		Length Over All Inches	Length of Flute Inches	Diameter Inches	Price Each		Length Over All Inches	Length of Flute Inches
	Carbon Steel	High Speed				Carbon Steel	High Speed		
1/16	\$5.20	\$ 7.50	6 1/2	2 3/4	1 3/8	\$ 8.00	\$12.25	8 5/8	3 1/4
1/8	5.20	7.75	6 5/8	2 3/4	1 1/2	8.20	12.50	8 3/4	3 3/8
3/16	5.20	8.00	6 3/4	2 3/4	1 3/4	8.40	12.75	8 1/2	3 3/8
1/4	5.35	8.25	6 7/8	2 3/4	1 5/8	8.60	13.00	9	3 3/8
5/16	5.50	8.50	7	2 3/8	1 7/8	8.80	13.25	9 1/8	3 3/8
3/8	5.65	8.75	7 1/8	2 3/8	1 1/2	9.00	13.50	9 1/4	3 3/8
7/16	5.80	9.00	7 1/4	2 3/8	1 3/4	9.20	13.85	9 3/8	3 3/8
1/2	5.95	9.25	7 3/8	2 3/8	1 1/2	9.40	14.20	9 1/2	3 3/8
5/8	6.10	9.50	7 3/8	3	1 1/2	9.60	14.55	9 1/2	3 3/8
3/4	6.25	9.75	7 1/2	3	1 1/2	9.80	14.90	9 5/8	3 3/8
7/8	6.40	10.00	7 5/8	3	1 3/4	10.00	15.25	9 3/4	3 3/8
1	6.55	10.25	7 3/4	3	1 3/4	10.20	15.60	9 7/8	3 3/8
1 1/16	6.70	10.50	7 7/8	3 1/8	1 3/4	10.40	15.95	10	3 3/8
1 1/8	6.85	10.75	8	3 3/8	1 3/4	10.60	16.30	10 1/8	4
1 1/4	7.00	11.00	8 1/8	3 3/8	1 3/4	10.80	16.65	10 1/4	4
1 1/2	7.20	11.25	8 1/4	3 3/8	1 3/4	11.00	17.00	10 1/4	4
1 3/4	7.40	11.50	8 3/4	3 3/4	1 3/4	11.20	17.35	10 3/8	4
1 5/8	7.60	11.75	8 3/8	3 3/4	1 3/4	11.40	17.70	10 1/2	4 1/4
1 7/8	7.80	12.00	8 1/2	3 3/4	1 3/4	11.60	18.05	10 5/8	4 1/4

SPECIFY ALL TOOLS BY OUR LIST NUMBERS

Continued on page 45.

"STANAR" ADJUSTABLE HAND REAMERS

NO. 123C—CARBON STEEL



NO. 660—HIGH SPEED STEEL

Continued from page 44.

FIG. 109

Diameter Inches	Price Each		Length Over All Inches	Length of Flute Inches	Diameter Inches	Price Each		Length Over All Inches	Length of Flute Inches
	Carbon Steel	High Speed				Carbon Steel	High Speed		
1 1/8	\$11.80	\$18.40	10 3/4	4 1/4	2 1/8	\$16.65	\$25.05	12 7/8	5
1 1/4	12.00	18.75	10 7/8	4 1/4	2 1/2	16.90	25.40	13	5
1 1/2	12.20	19.10	11	4 1/2	2 3/4	17.20	25.75	13 1/8	5
1 3/4	12.45	19.45	11 1/8	4 1/2	2 7/8	17.45	26.20	13 1/4	5
2	12.65	19.80	11 1/4	4 1/2	2 7/8	17.70	26.65	13 3/8	5
2 1/8	12.90	20.15	11 3/8	4 1/2	2 7/8	17.95	27.10	13 1/2	5
2 1/4	13.25	20.50	11 1/2	4 1/2	2 7/8	18.25	27.55	13 5/8	5
2 1/2	13.50	20.85	11 1/2	4 1/2	2 7/8	18.50	28.00	13 3/4	5 1/4
2 3/4	13.75	21.20	11 5/8	4 1/2	2 7/8	18.75	28.45	13 3/4	5 1/4
2 7/8	14.00	21.55	11 3/4	4 1/2	2 7/8	19.00	28.90	13 7/8	5 1/4
3	14.25	21.90	11 7/8	4 3/4	2 7/8	19.30	29.35	14	5 1/4
3 1/8	14.55	22.25	12	4 3/4	2 7/8	19.55	29.80	14 1/8	5 1/4
3 1/4	14.80	22.60	12 1/8	4 3/4	2 7/8	19.85	30.25	14 1/4	5 1/4
3 1/2	15.05	22.95	12 1/4	4 3/4	2 7/8	20.10	30.75	14 3/8	5 1/4
3 3/4	15.30	23.30	12 3/8	4 3/4	2 7/8	20.35	31.25	14 1/2	5 1/4
3 7/8	15.60	23.65	12 1/2	4 3/4	2 7/8	20.60	31.75	14 5/8	5 1/4
4	15.85	24.00	12 5/8	4 3/4	2 7/8	20.90	32.25	14 3/4	5 1/4
4 1/8	16.15	24.35	12 3/4	4 3/4	3	21.15	32.75	14 7/8	5 1/4
4 1/4	16.40	24.70	12 3/4	5	...	.....	.....	....	...

"STANAR" ADJUSTABLE SHELL REAMERS

NO. 123D—CARBON STEEL



NO. 661—HIGH SPEED STEEL

FIG. 110

Diameter Inches	Price Each		Length Over All Inches	Size Hole Inches	Length Of Flute Inches	Diameter Inches	Price Each		Length Over All Inches	Size Hole Inches	Length Of Flute Inches
	Carbon Steel	High Speed					Carbon Steel	High Speed			
1	\$ 5.10	\$ 7.50	2 1/8	3/8	1 1/4	2 1/8	\$11.00	\$19.00	3 1/2	1	2 1/4
1 1/8	5.10	7.75	2 1/8	3/8	1 1/4	2 3/8	11.50	19.50	3 1/2	1	2 1/4
1 1/4	5.20	8.00	2 1/8	3/8	1 1/4	2 1/2	12.00	20.00	3 1/2	1	2 1/4
1 1/2	5.35	8.25	2 1/8	3/8	1 1/4	2 3/4	12.50	20.50	3 3/4	1 1/4	2 1/4
1 3/4	5.50	8.50	2 1/2	1/2	1 1/2	2 1/2	13.00	21.00	3 3/4	1 1/4	2 1/4
1 7/8	5.90	9.00	2 1/2	1/2	1 1/2	2 3/8	13.50	21.50	3 3/4	1 1/4	2 1/4
2	6.35	9.50	2 1/2	1/2	1 1/2	2 1/2	14.00	22.00	3 3/4	1 1/4	2 1/4
2 1/8	6.90	10.00	2 1/2	1/2	1 1/2	3	14.50	22.50	3 3/4	1 1/4	2 1/4
2 1/4	7.40	10.50	2 1/2	1/2	1 1/2	3 1/8	15.00	23.00	3 3/4	1 1/4	2 1/4
2 1/2	7.60	11.00	2 1/2	1/2	1 1/2	3 3/8	15.50	23.75	3 3/4	1 1/4	2 1/4
2 3/4	7.80	11.50	2 3/4	5/8	2 1/8	3 1/2	16.00	24.50	4	1 1/2	3 1/4
2 7/8	8.00	12.00	2 3/4	5/8	2 1/8	3 3/4	16.50	25.25	4	1 1/2	3 1/4
3	8.15	12.50	2 3/4	5/8	2 1/8	3 1/2	17.00	26.00	4	1 1/2	3 1/4
3 1/8	8.35	13.00	2 3/4	5/8	2 1/8	3 3/8	17.50	26.75	4	1 1/2	3 1/4
3 1/4	8.50	13.50	2 3/4	3/4	2 1/8	3 1/2	18.00	27.50	4	1 1/2	3 1/4
3 1/2	8.70	14.00	2 3/4	3/4	2 1/8	3 3/4	18.50	28.25	4	1 1/2	3 1/4
3 3/4	8.85	14.50	3	3/4	2 1/8	3 1/2	19.00	29.00	4	1 1/2	3 1/4
4	9.00	15.00	3	3/4	2 1/8	3 3/8	19.50	29.75	4 1/2	1 3/4	3 1/4
4 1/8	9.25	15.50	3	3/4	2 1/8	3 1/2	20.00	30.50	4 1/2	1 3/4	3 1/4
4 1/4	9.50	16.00	3	3/4	2 1/8	3 3/4	20.50	31.25	4 1/2	1 3/4	3 1/4
4 1/2	9.70	16.50	3	1	2 1/8	3 1/2	21.00	32.00	4 1/2	1 3/4	3 1/4
4 3/4	10.00	17.00	3	1	2 1/8	3 3/8	21.50	32.75	4 1/2	1 3/4	3 1/4
5	10.25	17.50	3 1/2	1	2 1/8	3 1/2	22.00	33.50	4 1/2	1 3/4	3 1/4
5 1/8	10.50	18.00	3 1/2	1	2 1/8	4	22.50	34.25	5	2	3 1/4
5 1/4	10.75	18.50	3 1/2	1	2 1/8	...	.....	.....	...	...	...

SPECIFY ALL TOOLS BY OUR LIST NUMBERS

EXTRA BLADES FOR "STANAR" ADJUSTABLE REAMERS

These Blades are ground to the proper thickness to fit the slots in Reamer bodies; but after inserting, they must be ground on centers to the correct diameter.

BLADES FOR HAND REAMERS

Fitting Reamers of Following Diameters	List Price per Set	
	Carbon Steel	High Speed Steel
$\frac{1}{16}$ to $\frac{3}{32}$	\$2.75	\$ 5.25
$\frac{1}{16}$ " $\frac{1}{8}$	3.25	7.00
$\frac{1}{16}$ " $\frac{1}{4}$	4.50	9.50
$\frac{1}{16}$ " $\frac{1}{2}$	5.25	11.50
$\frac{2}{16}$ " $\frac{3}{4}$	6.25	14.00
$\frac{2}{16}$ " 3	6.75	16.50
.....
.....
.....

BLADES FOR SHELL REAMERS

Fitting Reamers of Following Diameters	List Price per Set	
	Carbon Steel	High Speed Steel
1 to $1\frac{1}{8}$	\$2.50	\$4.75
$1\frac{1}{2}$ " $1\frac{3}{4}$	2.75	6.00
$1\frac{7}{8}$ " $2\frac{1}{4}$	3.00	7.25
$2\frac{1}{8}$ " $2\frac{1}{2}$	3.50	9.25
$2\frac{3}{4}$ " $3\frac{1}{8}$	4.00	10.50
$3\frac{3}{8}$ " $3\frac{1}{2}$	4.75	12.50
4 " $4\frac{1}{8}$	5.50	15.00
$4\frac{1}{2}$ " $5\frac{1}{8}$	6.75	20.00
$5\frac{1}{4}$ " 6	8.75	25.00

ARBORS FOR "STANAR" ADJUSTABLE SHELL REAMERS

STRAIGHT SHANK—NO. 129S—FIG. 116



TAPER SHANK—NO. 129T—FIG. 117

Number	Price Each	Fitting Sizes	Length Over All Inches	Number	Price Each	Fitting Sizes	Length Over All Inches	Taper Shank
4	\$ 3.25	1 to $1\frac{1}{8}$	9	4	\$ 3.90	1 to $1\frac{1}{8}$	9	No. 2
5	3.50	$1\frac{1}{4}$ " $1\frac{3}{8}$	$9\frac{1}{2}$	5	4.20	$1\frac{1}{4}$ " $1\frac{3}{8}$	$9\frac{1}{2}$	" 2
6	3.75	$1\frac{1}{2}$ " $1\frac{1}{2}$	10	6	4.50	$1\frac{1}{2}$ " $1\frac{1}{2}$	10	" 2
7	4.00	$1\frac{7}{8}$ " $2\frac{1}{8}$	11	7	4.80	$1\frac{7}{8}$ " $2\frac{1}{8}$	11	" 2
8	4.50	$2\frac{1}{4}$ " $2\frac{1}{4}$	12	8	4.90	$2\frac{1}{4}$ " $2\frac{1}{4}$	12	" 4
9	5.25	$2\frac{3}{4}$ " $3\frac{1}{8}$	13	9	6.30	$2\frac{3}{4}$ " $3\frac{1}{8}$	13	" 4
10	7.75	$3\frac{1}{8}$ " $3\frac{1}{8}$	14	10	9.30	$3\frac{1}{8}$ " $3\frac{1}{8}$	14	" 5
11	10.50	$3\frac{3}{8}$ " $3\frac{1}{2}$	15	11	12.60	$3\frac{3}{8}$ " $3\frac{1}{2}$	15	" 5
12	14.00	4 " $4\frac{1}{8}$	16	12	16.80	4 " $4\frac{1}{8}$	16	" 5
13	18.00	$4\frac{1}{2}$ " $4\frac{1}{2}$	17	13	21.60	$4\frac{1}{2}$ " $4\frac{1}{2}$	17	" 5
14	22.00	$4\frac{7}{8}$ " 6	18	14	26.40	$4\frac{7}{8}$ " 6	18	" 5or6

All sizes and dimensions not listed are special and subject to special prices.

THE NEW BRITAIN HIGH SPEED EXPANSION REAMERS
"CRITCHLEY IMPROVED"

FIG. 3821

The cutting blades are made of the finest quality of High Speed or Carbon Steel and are made interchangeable.

One of the great advantages of these reamers is that they have an even number of blades requiring only a micrometer to help set them to any desired size. In this way spoiled work is avoided. They expand $\frac{1}{16}$ inch when others expand .010 and are so made that they will ream smooth, true holes, cut freely and will not chatter.

No.	Min. Diam. Inches	Max. Diam. Inches	Length Cutter	Full Length	PRICE EACH				
					Carbon Steel	High Speed Steel	Extra Adjusting Nuts	EXTRA BLADES	
								Carbon Steel	High Speed Steel
1	$\frac{1}{16}$	$\frac{1}{8}$	$1\frac{7}{8}$	$5\frac{1}{2}$	\$4.50	\$5.75	\$0.30	\$0.30	\$0.70
2	$\frac{1}{8}$	$\frac{1}{4}$	2	$5\frac{3}{4}$	4.50	5.75	.30	.30	.70
3	$\frac{1}{4}$	$\frac{3}{8}$	$2\frac{1}{2}$	6	4.75	6.00	.30	.30	.70
4	$\frac{3}{8}$	$\frac{1}{2}$	$2\frac{1}{2}$	$6\frac{1}{2}$	4.75	6.25	.30	.30	.70
5	$\frac{1}{2}$	$\frac{5}{8}$	$2\frac{5}{8}$	7	5.00	6.50	.35	.35	.75
6	$\frac{5}{8}$	$\frac{3}{4}$	$2\frac{5}{8}$	$7\frac{1}{2}$	5.00	6.80	.35	.35	.75
7	$\frac{3}{4}$	$\frac{7}{8}$	3	8	5.50	7.10	.40	.40	.80
8	$\frac{7}{8}$	$1\frac{1}{8}$	$3\frac{3}{8}$	9	5.80	7.85	.40	.40	.80
9	$1\frac{1}{8}$	$1\frac{1}{4}$	$3\frac{5}{8}$	10	7.00	8.75	.45	.45	.85
10	$1\frac{1}{4}$	$1\frac{3}{8}$	$3\frac{7}{8}$	11	8.00	10.00	.45	.45	.85
11	$1\frac{3}{8}$	$1\frac{1}{2}$	$4\frac{1}{4}$	12	10.00	12.50	.55	.55	1.00
12	$1\frac{1}{2}$	$1\frac{3}{4}$	$4\frac{3}{4}$	14	12.00	15.00	.65	.65	1.35
13	$1\frac{3}{4}$	$2\frac{1}{8}$	5	16	15.00	18.75	.70	.70	1.65
14	$2\frac{1}{8}$	$2\frac{1}{4}$	$5\frac{1}{2}$	18	18.00	23.00	.80	.80	1.80
15	$2\frac{1}{4}$	$2\frac{3}{8}$	$6\frac{1}{2}$	20	22.00	27.50	1.00	1.00	2.00
16	$2\frac{3}{8}$	$3\frac{1}{2}$	$7\frac{1}{4}$	22	26.00	32.50	1.25	1.25	2.20
17	$3\frac{1}{2}$	$4\frac{1}{8}$	8	24	30.00	38.00	1.50	1.50	2.45

SPECIFY ALL TOOLS BY OUR LIST NUMBERS

GENUINE CRITCHLEY EXPANDING REAMERS



FIG. 111

The body has taper grooves, fitted with cutters; a screw thread is cut on the body of the Tool, and a portion of it is left in the center to prevent springing; the cutters are beveled at each end and confined in their places by nuts, so it is only necessary to slacken them off and slide the cutters up or down in the tapered grooves, to expand or contract their outside diameters and thus adapt them to any size within their limit. They expand $\frac{1}{16}$ th on the $\frac{1}{2}$ inch size, increasing as they go up.

One has the range of four Reamers of other makes.

LIST PRICE

No.	Begins At Diameter	Expands to Diameter	Length Cutter	Full Length	Price
00	$\frac{1}{2}$ in.	$\frac{1}{2}$ in.	$1\frac{3}{4}$ in.	$5\frac{1}{2}$ in.	\$4.50
00 $\frac{1}{4}$	$\frac{1}{2}$ "	$\frac{1}{2}$ "	$1\frac{3}{4}$ "	$5\frac{5}{8}$ "	4.50
00 $\frac{1}{2}$	$\frac{1}{2}$ "	$\frac{1}{2}$ "	$1\frac{3}{4}$ "	$5\frac{3}{4}$ "	4.50
0	$\frac{3}{8}$ "	$\frac{1}{2}$ "	$2\frac{1}{2}$ "	$6\frac{1}{2}$ "	4.75
0 $\frac{1}{2}$	$\frac{1}{2}$ "	$\frac{1}{2}$ "	$2\frac{1}{2}$ "	$6\frac{3}{4}$ "	4.75
1	$\frac{3}{4}$ "	$\frac{1}{2}$ "	$2\frac{5}{8}$ "	7 "	5.00
1 $\frac{1}{2}$	$\frac{1}{2}$ "	$\frac{1}{2}$ "	$2\frac{5}{8}$ "	$7\frac{1}{4}$ "	5.00
2	$\frac{7}{8}$ "	$\frac{1}{2}$ "	$2\frac{3}{4}$ "	8 "	5.50
3	$\frac{1}{2}$ "	$1\frac{1}{8}$ "	3 "	9 "	5.80
4	$1\frac{1}{8}$ "	$1\frac{1}{8}$ "	$3\frac{1}{4}$ "	10 "	6.60
5	$1\frac{1}{2}$ "	$1\frac{1}{8}$ "	$3\frac{3}{4}$ "	11 "	7.50
6	$1\frac{1}{2}$ "	$1\frac{1}{8}$ "	4 "	12 "	8.50
7	$1\frac{1}{2}$ "	$1\frac{1}{8}$ "	$4\frac{1}{4}$ "	14 "	9.90
8	$1\frac{1}{2}$ "	$2\frac{1}{4}$ "	$4\frac{3}{4}$ "	16 "	11.50
9	$2\frac{1}{4}$ "	$2\frac{5}{8}$ "	$5\frac{1}{4}$ "	18 "	14.00
10	$2\frac{3}{8}$ "	$3\frac{1}{8}$ "	$6\frac{1}{4}$ "	20 "	17.00
11	$3\frac{1}{8}$ "	$3\frac{9}{16}$ "	7 "	22 "	20.00
12	$3\frac{1}{8}$ "	$4\frac{1}{8}$ "	$7\frac{3}{4}$ "	24 "	24.00

REPAIR PARTS



EXTRA CUTTERS

FIG. 112



EXTRA ADJUSTING NUTS

FIG. 113

Reamer	No. of Blades	Price each	Reamer	Price each
No. 00 to No. 1	5	\$0.30	No. 00 to No. 3	\$0.30
" 2 " " 3	5	.36	" 4	.35
" 4	5	.40	" 5	.40
" 5	5	.44	" 6	.45
" 6	5	.50	" 7	.56
" 7	6	.60	" 8	.60
" 8	6	.70	" 9	.70
" 9	6	.80	" 10	.90
" 10	6	.90	" 11	1.00
" 11	6	1.00	" 12	1.20
" 12	6	1.20		

CRITCHLEY REAMERS WITH MORSE TAPER SHANKS NOT CARRIED IN STOCK. CAN BE FURNISHED FROM FACTORY.

SETS OF GENUINE CRITCHLEY EXPANDING REAMERS IN HANDSOME HARDWOOD CASE

Set No. 1, Seven sizes, No. 00 to No. 1 $\frac{1}{2}$ Inclusive \$33.00

Set No. 2, Ten " No. 00 to No. 4 " \$50.90

CRITCHLEY AUTOMOBILE CYLINDER REAMER

This is a shell reamer with taper slots and fitted with 8 semi-high speed steel cutters. As will be seen from cut it is only necessary to loosen the top nut and screw on the lower one to make the reamer cut larger.

This reamer has an adjustment of $\frac{1}{8}$ inch. There is a shaft extending through the reamer more than the length of the cylinder; on this shaft is fitted a taper guide that fits in bottom end of cylinder to be reamed, thus insuring a straight hole.

This tool will ream a $3\frac{3}{4}$ -inch cylinder as smooth and clean as a gun barrel at a cost of labor that is astonishing to mechanic and car-owner, and any repairman is enabled to do as good work as the shop with boring mills and internal grinders. No complicated jigs are necessary to adjust or govern it; simple to use as any reamer. Two men on the ends of a 36 tap wrench will ream a 4-cylinder engine in 25 minutes. In other words it costs ten cents per cylinder to ream an engine.

Reamer must be used in perpendicular position, never in a lathe. It may be used in a drill press, but the time necessary to attach a chuck really offsets the advantage.

We guarantee "no chattering or bucking"—consequently glass-smooth walls.

Ford size $3\frac{3}{4}$ inches, adjustment $\frac{1}{8}$ inch.

Dodge size $3\frac{3}{8}$ inches, adjustment $\frac{1}{8}$ inch.

Other sizes made to order.

List price \$35.00

Can be furnished from Factory with No. 3 or No. 4 Morse Taper Shank.



FIG. 120

THE MARTELL ALIGNING REAMER

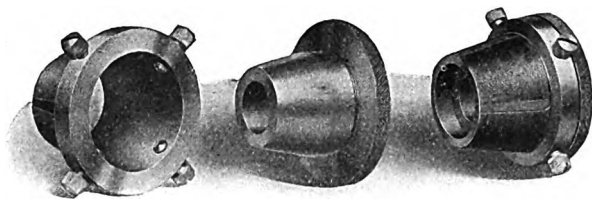


FIG. 5144

The Martell Aligning Reamer is adapted to automobile repair and machine shop work.

It is used for reaming a series of bearings where accuracy of alignment and bearing sizes are essential.

In correctly fitting a shaft to a series of bearings, three things must be accomplished:

1. Perfect alignment through all bearings.
2. Correct position of shaft in relation to other shafts or parts dependent upon it for motion.
3. Correct size of bore of bearings, allowing for oil clearance.

All of these results are easily secured, and, furthermore, a saving of from 50 per cent to 95 per cent of the time spent in hand scraping is effected.

The alignment of the reamer bar is obtained by means of several bearings, each consisting of centering inner bushing, C, held in a conical sleeve, B, the conical portion of which is provided with a fine pitch thread.

These conical sleeves are screwed securely into the soft metal of the bearings to be reamed and the centering bushings adjusted until the reamer bar is in the desired position and perfectly aligned through all bearings.

Set screws are provided for properly maintaining the correct setting.

The reamers are of the inserted blade type; the blades depending for expansion upon a series of wedges on which they rest.

This equipment will produce bearings that are exactly in line. Furthermore, the bearings will show a greater area in contact with the shaft than those scraped by hand because the supporting bushings, acting as guides, compel the reamer to revolve in a true circle.

These equipments are made in three sets, No. 0 and No. 1 covering motors which have three (3) or five (5) bearings and No. 2 covering motors which have four (4) or seven (7) bearings.

No. 0 set includes 1 Reamer Bar; 1 Short Bar for connecting rod work; 1 Reamer Head with any one of 1½-in., 1⅝-in., 1¾-in. dia. blades; 3 Centering Bushings; 2 Spanners; 1 Gear Bushing and a box.

No. 1 set includes 1 Long Reamer Bar; 1 Short Reamer Bar for connecting rod work; 1 Reamer Head (any stock size); 3 complete Centering Bushings; 2 Spanner Wrenches; 1 Gear Bushing; 1 box.

No. 2 set includes 1 Long Reamer Bar; 1 Short Reamer Bar for connecting rod work; 1 Reamer Head (any stock size); 4 complete Centering Bushings; 2 Spanner Wrenches; 1 Gear Bushing; 1 box.

The stock sizes of reamer blades for No. 0 are 1½-in., 1⅝-in. and 1¾-in., and for No. 1 and No. 2 sets they are 1¾-in., 1⅞-in., 2-in., 2⅛-in., 2¼-in. and 2⅝-in.

One reamer head is furnished for the No. 0 equipment and the three sizes are available by different blades as above. This reamer is not interchangeable with No. 1 or No. 2 equipment.

For No. 1 and No. 2 equipment one head is furnished for sizes 1¾-in. to 2-in., and a larger head for sizes 2-in. to 2⅝-in., inclusive.

One reamer head and one set of blades are furnished with each set.

FORD EQUIPMENT

A special reaming outfit has been developed for the Ford car. With this outfit it is possible to obtain a better result in a very much shorter time and at a lower cost than can be obtained by hand. The reamer being adjustable, it is possible to size each bearing to fit the crankshaft pin which runs in it. No hand scraping whatever is necessary.

REBABBITTING FIXTURE

The Martell rebabbitting fixture for Ford motors, consists of a cast-iron frame for locating and holding the line arbor in position for pouring the babbitt, the line arbor being supplied with stops or dams which adjust against the ends of the bearings to prevent the babbitt from running out, and form the end fillets on the bearings.

When the fixture is set up it is ready for babbitt pouring and there is left about ⅛-in. excess metal to be removed by the reamer when fitting to crankshaft sizes.

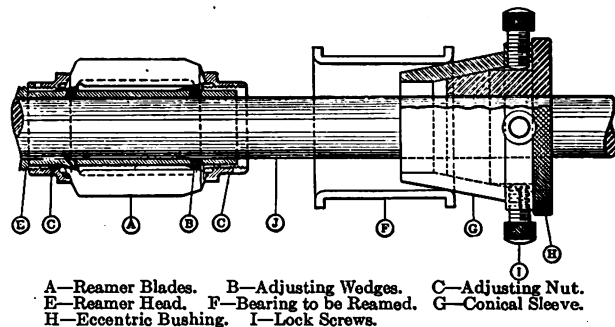


FIG. 5148

LIST PRICES

No. 0 Aligning reamer complete for three or five bearing motor with one reamer head and one set of blades

List Price, \$140.00

Extra reamer heads complete with one set of blades.

Per set..... List Price, \$30.00

Extra set of blades..... List Price, \$6.00

No. 1 Aligning Reamer complete for three or five bearing motors with one reamer head and one set of blades (any of above sizes)..... List Price, \$160.00

No. 2 Aligning Reamer complete for four or seven bearing motors with one reamer head and one set of blades (any of above sizes)..... List Price, \$180.00

Extra reamer heads with any stock size blades.

List Price, \$32.50

Extra set of blades..... List Price, \$6.00

Ford equipment complete with aligning reamer, centering bushings and re-babbitting fixture (including ladle and babbitt for one set of bearings)..... List Price, \$100.00

Extra reamer complete with blades..... List Price, \$23.00

Babbitting fixture complete alone..... List Price, \$25.00

Reaming equipment alone..... List Price, \$75.00

When ordering please state size of crankshaft and number of bearings.

Aligning reamers for other uses and special sizes other than shown will be made to order at special prices.

EZY-OUT SCREW EXTRACTOR

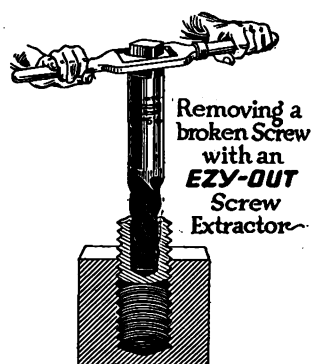


FIG. 144

When a set or cap-screw, stud or stay-bolt snaps and threatens a tedious tie-up, this is the only one tool that will remove that broken screw quickly and easily—it's the only tool designed expressly for the job.

With "EZY-OUT" on the job there's no need of getting out a whole kitful of tools—just drill a hole in the broken screw, insert the proper size "EZY-OUT", slip on a tap-wrench and twist—and out comes the broken section—backed out on its own threads without danger to the threads of the original hole, and in a fraction of the time required by the old-time, file-punch-and-profanity method.

In all, there are twelve sizes of "EZY-OUT" Screw Extractors. Any single size, however, will hardly prove sufficient for the requirements of the average shop.

Therefore, for your convenience and ultimate economy, we have collected related sizes into handy sets—each set being selected with particular reference to the variety of work met with in a given field.

No. 15 Set includes "EZY-OUT" Nos. 1, 2, 3, 4 and 5. It is designed with particular reference to the needs of the tool-room and the lighter type of machine-shop work. Price, in neat wooden box..... \$3.00

No. 15A Set includes "EZY-OUT" Nos. 1, 2, 3, 4, 5 and 6, and answers the demand of the garage trade for an all-purpose "EZY-OUT" Set. Price, in wooden box..... \$4.00

No. 16 Set includes "EZY-OUT" Nos. 6, 7, 8 and 9, known as the "Heavy Shop Set," and is our answer to the demand for an "EZY-OUT" Set designed especially for the requirements of railroad shops and yards, structural and bridge workers and similar fields involving a heavy and broad range of work. Price, in wooden box..... \$6.65

No. 17 Set (Extractors Nos. 4, 5 and 6) is the original "EZY-OUT" Set for general utility service in machine shop, garage and factory. It is an ideal all-purpose set. Price, in wooden box..... \$2.35

"EZY-OUT" Screw Extractors Numbers 10, 11 and 12 are sold individually. As their range of application is somewhat similar, any one of these three large sizes, when carefully chosen, will generally prove sufficient for the entire field of specialized work.

The table gives the dimensions of "EZY-OUT" Screw Extractors.

Choose the set best adapted to your individual needs.

Observe particularly the "point diameter" and the "large diameter" columns, as "EZY-OUT" Screw Extractors are most effective when the drilled hole, in which they operate, is of sufficient depth to permit their thorough entrance without bottoming. This hole should also leave the side wall of the broken screw heavy enough to prevent expansion under the torsional strain due to extraction.

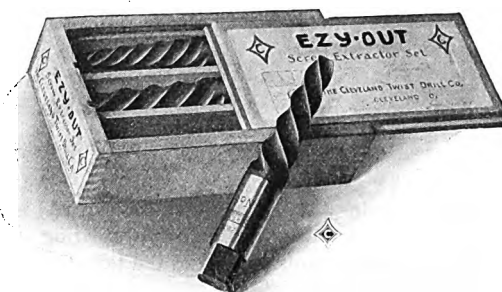


FIG. 145

Tool No.	Point Diam.	Large Diam.	Length
1	$\frac{1}{16}$ "	$\frac{1}{8}$ "	2 $\frac{1}{4}$ "
2	$\frac{1}{8}$ "	$\frac{3}{16}$ "	2 $\frac{1}{2}$ "
3	$\frac{1}{4}$ "	$\frac{1}{4}$ "	2 $\frac{3}{4}$ "
4	$\frac{1}{2}$ "	$\frac{3}{8}$ "	3 $\frac{1}{8}$ "
5	$\frac{3}{8}$ "	$\frac{1}{2}$ "	3 $\frac{1}{2}$ "
6	$\frac{7}{8}$ "	$\frac{5}{8}$ "	3 $\frac{3}{4}$ "
7	$1 \frac{1}{2}$ "	$\frac{3}{4}$ "	4 $\frac{1}{8}$ "
8	$1 \frac{3}{4}$ "	$1 \frac{1}{4}$ "	4 $\frac{3}{8}$ "
9	1"	$1 \frac{1}{2}$ "	4 $\frac{5}{8}$ "
10	$1 \frac{1}{4}$ "	$1 \frac{3}{8}$ "	5 "
11	$1 \frac{1}{2}$ "	$1 \frac{7}{8}$ "	5 $\frac{5}{8}$ "
12	$1 \frac{3}{8}$ "	2 $\frac{1}{8}$ "	6 $\frac{1}{4}$ "

SOLD INDIVIDUALLY

No. 10.....	Price each \$4.00
No. 11.....	" " 5.35
No. 12.....	" " 6.65

THE "GUN" TAP



NO. 301—FIG. 146

It is generally accepted that 90% of all used taps break before they wear out. The "Gun" Tap is at least twice as strong and requires not more than half as much power to drive as the ordinary tap. Therefore a "Gun" Tap very seldom breaks in the work. Furthermore, one "Gun" Tap in many cases serves where formerly two or three taps were necessary for the operation.



FIG. 147

The cutting edges at the point of the tap (A) are ground at an angle (B) to the axis. This gives a shearing cut and the long curling chips are thrown ahead of the tap instead of breaking up and collecting in the flutes.

The cutting edges have a decided positive rake, particularly designed for free cutting.

The "Gun" Tap does all its cutting on the first few teeth, the rest of the thread acts as a lead screw, steadying the tap and producing a very accurate thread.

A. S. M. E. STANDARD

Screw Gage No.	Price Each	No. Threads to the Inch		Screw Gage No.	Price Each	No. Threads to the Inch	
		Std.	Also fur- nished			Std.	Also furn'd
4	\$0.40	48	32, 36, 40	10	\$0.40	30	24, 28, 32
5	.35	44	36, 40	12	.45	28	24, 32
6	.35	40	32, 36	14	.45	24	20
7	.35	36	30, 32	16	.45	22	20
8	.35	36	30, 32, 40	18	.50	20	18
9	.35	32	24, 30	20	.50	20	16, 18

GREATER SPEED, UNIFORM THREADS AND NO BREAKAGE OF THIS TAP MEANS TAPPING COSTS REDUCED, ACCURATE RESULTS AND PRODUCTION INCREASED.

"IT SHEARS"

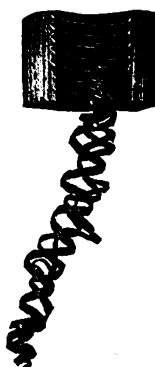


FIG. 148

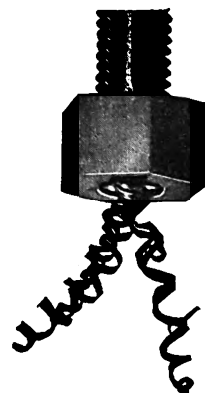


FIG. 149

The "Gun" Tap will hold its size closer in all materials than any other tap made, and because the grinding is done only on the angular cutting edges, the tap will cut right up to size until the tap is ground down to the last three or four teeth.

The "Gun" Tap is an exclusive product of the Greenfield Tap and Die Corporation and must not be confused with the variety of two- and three-flute taps now on the market.

With every shipment of "Gun" Taps, detailed instructions are sent for grinding and maintaining the original shape and cutting angle.

Left hand taps are special. All sizes and pitches not listed below are special.

FRACTIONAL SIZES

Diameter Tap Inches	Price Each	Number Threads to the Inch	
		U. S. Std.	S. A. E. Std.
$\frac{1}{16}$	\$0.40	24, 30, 32	
$\frac{1}{8}$	.45	20, 24, 32	28
$\frac{1}{4}$	.50	18, 20, 32	24
$\frac{3}{8}$	.55	16	24
$\frac{1}{2}$	.60	14	20
$\frac{3}{4}$	.70	13	20
$\frac{1}{2}$	.80	12	18
$\frac{5}{8}$	.90	11	18
$\frac{3}{4}$	1.05	11	16
$\frac{7}{8}$	1.20	10	16

SEE OUR LINES OF GENERAL MACHINERY, PAGES 800 TO 899

YOU WILL FIND SOME VERY USEFUL INFORMATION TABLES ON PAGES NOS. 900 TO 930 INCLUSIVE

HAND TAPS

LESS THAN $\frac{1}{4}$ INCH IN DIAMETER
NO. 300



TAPER
FIG. 150



PLUG
FIG. 151



BOTTOMING
FIG. 152

U. S. Threads furnished unless otherwise ordered.
All sizes and threads not listed are special and subject to special prices.
Left hand taps are special.

SIZES AND PRICES

Diam. of Tap In.	Price		No. Threads to the Inch Standard Pitches		U. S. Form Threads also furnished	Lgth. Over All In.
	Each	Per Set	U. S.	Whitworth		
$\frac{1}{16}$	\$0.50	\$1.50	64	60	72	$1\frac{7}{8}$
$\frac{1}{8}$	.45	1.35	60	..	72	$1\frac{7}{8}$
$\frac{3}{16}$	.40	1.20	50	48	48	$1\frac{7}{8}$
$\frac{1}{4}$	.40	1.20	48	..	..	$1\frac{7}{8}$
$\frac{5}{16}$	.35	1.05	40	40	32	2
$\frac{3}{8}$	.35	1.05	40	..	..	2
$\frac{7}{16}$	.35	1.05	36	32	32	$2\frac{1}{8}$
$\frac{1}{2}$	.35	1.05	32	..	..	$2\frac{1}{8}$
$\frac{9}{16}$	.40	1.20	24	24	32	$2\frac{1}{4}$
$\frac{5}{8}$	.40	1.20	24	..	..	$2\frac{3}{8}$
$\frac{3}{4}$	.45	1.35	24	24	32	$2\frac{3}{8}$
$\frac{7}{8}$	.45	1.35	24	..	..	$2\frac{1}{2}$

$\frac{1}{4}$ INCH AND LARGER
NO. 302

SIZES AND PRICES

Diam. of Tap Inches	Price		Number of Threads to the Inch					Lght. Over All In.
			Standard Pitches				U. S. Form Threads also Furnished	
	Each	Per Set	U. S. Std.	A. A. W. Std.	Whit- worth Std.	V Fm.		
1/4	\$.45	\$1.35	20	28	20	20	24, 27, 32	2 1/2
3/8	.50	1.50	18	24	18	18	20, 27, 32	2 3/8
1/2	.55	1.65	16	24	16	16	20, 27	2 1/2
5/8	.60	1.80	14	20	14	14	24, 27	3 5/8
3/4	.70	2.10	13	20	12	12	12, 24, 27	3 3/8
7/8	.80	2.40	12	18	12	12	27	3 1/2
1	.90	2.70	11	18	11	11	12, 27	3 13/16
1 1/8	1.05	3.15	11	16	11	..	..	4 3/8
1 1/4	1.20	3.60	10	16	10	10	12, 27	4 1/2
1 3/8	1.40	4.20	10	..	10	..	..	4 1/2
1 1/2	1.60	4.80	9	14, 18	9	9	12, 27	4 1/2
1 3/4	1.80	5.40	9	..	9	..	..	4 3/4
2	2.00	6.00	8	14	8	8	12, 27	5 1/8
2 1/8	2.25	6.75	7	12	7	..	..	5 1/8
2 1/4	2.60	7.80	7	12	7	..	..	5 3/4
2 3/8	3.00	9.00	6	12	6	..	..	6 1/8
2 1/2	3.50	10.50	6	12	6	..	..	6 3/8
2 3/4	4.20	12.60	5 1/2	..	5	..	..	6 11/16
3	5.00	15.00	5	..	5	..	..	7
3 1/8	5.80	17.40	5	..	4 1/2	..	..	7 1/8
3 1/4	6.70	20.10	4 1/2	..	4 1/2	..	..	7 5/8
3 3/8	8.00	24.00	4 1/2	..	4 1/2	..	..	8
3 1/2	9.20	27.60	4 1/2	..	4	..	..	8 1/4
3 3/4	10.50	31.50	4	..	4	..	..	8 1/2
4	11.50	34.50	4	..	4	..	..	8 3/4

STANDARD SIZES OF SPARK PLUG TAPS

$\frac{1}{8}$ " S. A. E.	Each \$1.60
$\frac{1}{4}$ " Briggs Standard Pipe	2.00
18 m/m—1.5 m/m Pitch	1.05

PUMP ROD TAPS

Pump Rod Taper Taps $\frac{3}{8}$ ", $\frac{1}{2}$ ", $\frac{3}{4}$ " V thread $\frac{1}{2}$ " oversize, can be furnished at regular hand tap prices.



TAPER
FIG. 153



PLUG
FIG. 154



BOTTOMING
FIG. 155

Orders for hand taps to and including $\frac{1}{2}$ inch will be filled with taps having shanks full diameter of thread. Taps $\frac{3}{8}$ inch and larger will be furnished with shanks size of bottom of thread.

We will furnish at regular prices $\frac{3}{8}$ inch hand taps with full size shanks.

U. S. Std. threads furnished unless otherwise ordered.

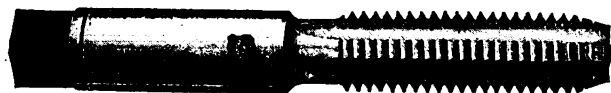
Sizes, lengths and threads not listed are subject to special prices.

Left hand taps are special.

SPECIFY ALL TOOLS BY OUR LIST NUMBERS

SERIAL HAND TAPS

NO. 309



NO. 1—FIG. 156



NO. 2—FIG. 157



NO. 3—FIG. 158

These Taps are designed for tapping holes in tough materials, and where very accurate, clean-cut threaded holes are wanted.

Serial Hand Taps are furnished with shanks full size of thread from $\frac{1}{4}$ inch to $\frac{3}{8}$ inch inclusive and with shanks size of bottom of thread on $\frac{1}{16}$ inch and larger.

United States Standard form of thread furnished unless otherwise specified.

Sizes, lengths and threads not listed are subject to special prices.

Left hand taps are special.

The Taps in each set are ringed as shown above, so that each one can be easily identified.

The No. 3 Tap is the only one of each set that is full size, the No. 1 and No. 2 Taps being proportionate amounts under size at the pitch diameter as well as the outside diameter.

No. 1 Tap roughs out the thread, No. 2 Tap cuts its proportionate share, making the thread a little fuller, and No. 3 Tap has but a little stock to remove to finish the thread to full size.

These Taps will work successfully under strains which no other Taps can stand, and we recommend them for hard service.

SIZES AND PRICES

Diameter of Tap Inches	Price		No. of Threads to the Inch		Length Over All Inches
	Each	Per Set	U. S. Std.	Whitworth Std.	
$\frac{1}{4}$	\$0.45	\$1.35	20	20	$2\frac{1}{2}$
$\frac{1}{8}$	.50	1.50	18	18	$2\frac{1}{4}$
$\frac{3}{8}$	.55	1.65	16	16	$2\frac{1}{4}$
$\frac{1}{2}$	.60	1.80	14	14	$3\frac{1}{4}$
$\frac{5}{8}$	.70	2.10	13	12	$3\frac{3}{4}$
$\frac{3}{4}$	.80	2.40	12	12	$3\frac{1}{2}$
$\frac{7}{8}$	.90	2.70	11	11	$3\frac{1}{2}$
1	1.05	3.15	11	11	$4\frac{1}{4}$
$1\frac{1}{8}$	1.20	3.60	10	10	$4\frac{1}{4}$
$1\frac{1}{4}$	1.40	4.20	10	10	$4\frac{1}{4}$
$1\frac{3}{8}$	1.60	4.80	9	9	$4\frac{1}{4}$
$1\frac{1}{2}$	1.80	5.40	9	9	$4\frac{1}{4}$
$1\frac{3}{4}$	2.00	6.00	8	8	$5\frac{1}{8}$
2	2.25	6.75	7	7	$5\frac{1}{8}$
$2\frac{1}{4}$	2.60	7.80	7	7	$5\frac{1}{4}$
$2\frac{3}{8}$	3.00	9.00	6	6	$6\frac{1}{4}$
$2\frac{1}{2}$	3.50	10.50	6	6	$6\frac{3}{4}$

STOVE BOLT TAPS

NO. 310



FIG. 159

These Taps correspond in size to the American Screw Co.'s Stove Bolts.

Stove Bolt Taps are furnished in plug style only.

Left hand taps are special.

All sizes and threads not listed will be charged at special prices.

SIZES AND PRICES

Diameter of Tap Inches	Price		Number of Threads to the Inch
	Each	Per Dozen	
$\frac{1}{8}$	\$.40	\$4.80	24
$\frac{1}{4}$	.45	5.40	18
$\frac{3}{8}$	.50	6.00	18
$\frac{1}{2}$	.55	6.60	16
..
..

MACHINE SCREW TAPS



FIG. 161

These Taps furnished in sets of Taper, Plug and Bottoming, when desired, at regular prices.

Plug Taps furnished unless otherwise specified.

All sizes and threads not listed will be considered special and subject to special prices.

Left Hand Machine Screw Taps are special.

SIZES AND PRICES NO. 305A OLD STANDARD

Size of Screw Gauge	Price		Standard Number of Threads	Threads also Furnished
	Each	Per Doz.		
1	\$.50	\$6.00	72	56
2	.45	5.40	56	64
3	.40	4.80	48	56
4	.40	4.80	36	32, 40, 48
5	.35	4.20	36	40
6	.35	4.20	32	40
7	.35	4.20	32	..
8	.35	4.20	32	30, 40
9	.35	4.20	30	32
10	.40	4.80	24	28, 30, 32
12	.45	5.40	24	32
14	.45	5.40	20	24
16	.45	5.40	18	20
18	.50	6.00	18	20
20	.50	6.00	16	18

NOTE—We carry these Taps in stock and will furnish them whenever they are specified; but we strongly advise that the A. S. M. E. Standard Taps be used.

SIZES AND PRICES NO. 305 A. S. M. E. STANDARD

Screw Gauge No.	Basic Outside Diam. Inches	Price		No. Threads to the Inch	
		Each	Per Doz.	Stand- ard	Also Furn'd
0	.060	\$.50	\$6.00	80	....
1	.073	.50	6.00	72	56, 64
2	.086	.45	5.40	64	56
3	.099	.40	4.80	56	48
4	.112	.40	4.80	48	32, 36, 40
5	.125	.35	4.20	44	36, 40
6	.138	.35	4.20	40	32, 36
7	.151	.35	4.20	36	30, 32
8	.164	.35	4.20	36	30, 32, 40
9	.177	.35	4.20	32	24, 30
10	.190	.40	4.80	30	24, 28, 32
12	.216	.45	5.40	28	24, 32
14	.242	.45	5.40	24	20
16	.268	.45	5.40	22	18, 20
18	.294	.50	6.00	20	18
20	.320	.50	6.00	20	16, 18

PULLEY TAPS

NO. 308



FIG. 162

SIZES AND PRICES

Diam. of Tap Inches	Length Over All—Price Each					No. of Threads to the Inch
	6 in.	8 in.	10 in.	12 in.	14 in.	
1/4	\$0.65	\$0.70	....	....	....	20
5/16	.70	.75	....	....	....	18
3/8	.80	.85	\$0.90	\$0.95	\$1.00	16
7/16	.85	.95	1.00	1.05	1.15	14
1/2	.95	1.05	1.10	1.15	1.25	13
5/8	1.00	1.15	1.25	1.35	1.45	12
3/4	1.10	1.35	1.40	1.50	1.65	11
7/8	....	....	1.85	1.95	2.00	10
1	....	....	....	....	....	..

Pulley Taps are regularly furnished in plug style only.

United States Standard form of thread will be furnished.

Sizes, lengths and threads not listed are subject to special prices.

Left hand taps are special.

NUT TAPS

NO. 306

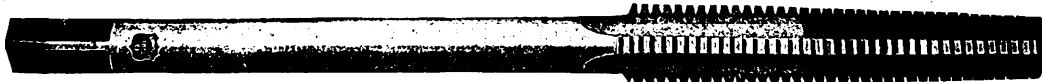


FIG. 163

U. S. Threads furnished unless otherwise ordered.
S.A.E. and Whitworth Standard threads furnished at regular prices if specified.

All sizes, lengths and threads not listed are special, and subject to special prices.

Left hand taps are special.

SIZES AND PRICES

Diam. of Tap Ins.	Price Each	No. of Threads to the Inch			Length of Thread Inches	Length Over All Inches	Diam. of Tap Ins.	Price Each	No. of Threads to the Inch			Length of Thread Inches	Length Over All Inches
		U. S. Std.	S.A.E. Std.	Whit- worth Std.					U. S. Std.	S.A.E. Std.	Whit- worth Std.		
$\frac{1}{16}$	\$0.60	24, 32	..	24	$1\frac{1}{4}$	$4\frac{1}{2}$	1	\$3.15	8	14	8	$4\frac{1}{8}$	11
$\frac{1}{8}$	.60	20	28	20	$1\frac{5}{8}$	5	$1\frac{1}{8}$	3.70	7	12	7	$4\frac{1}{4}$	$11\frac{1}{2}$
$\frac{1}{4}$	.70	18	24	18	$1\frac{3}{4}$	$5\frac{1}{2}$	$1\frac{1}{4}$	4.50	7	12	7	$4\frac{1}{4}$	12
$\frac{3}{8}$	.80	16	24	16	$2\frac{1}{8}$	6	$1\frac{3}{8}$	5.50	6	12	6	$5\frac{1}{4}$	$12\frac{1}{2}$
$\frac{1}{2}$	.90	14	20	14	$2\frac{1}{2}$	$6\frac{1}{2}$	$1\frac{1}{2}$	6.75	6	12	6	$5\frac{3}{4}$	13
$\frac{5}{8}$	1.00	13	20	12	$2\frac{3}{4}$	7	$1\frac{5}{8}$	8.00	$5\frac{1}{2}$	..	5	$5\frac{1}{2}$	$13\frac{1}{2}$
$\frac{3}{4}$	1.15	12	18	12	$2\frac{3}{4}$	$7\frac{1}{2}$	$1\frac{3}{4}$	9.25	5	..	5	$5\frac{1}{2}$	14
$\frac{7}{8}$	1.35	11	18	11	$2\frac{3}{4}$	8	$1\frac{7}{8}$	10.75	5	..	$4\frac{1}{2}$	$6\frac{1}{8}$	$14\frac{1}{2}$
$1\frac{1}{8}$	1.60	11	16	11	$2\frac{3}{4}$	$8\frac{1}{2}$	2	12.25	$4\frac{1}{2}$	..	$4\frac{1}{2}$	$6\frac{1}{8}$	15
$1\frac{1}{4}$	1.85	10	16	10	$3\frac{1}{4}$	9	$2\frac{1}{8}$	14.00	$4\frac{1}{2}$	..	$4\frac{1}{2}$	$6\frac{1}{8}$	$15\frac{1}{2}$
$1\frac{3}{8}$	2.15	10	..	10	$3\frac{1}{4}$	$9\frac{1}{2}$	$2\frac{1}{4}$	15.75	$4\frac{1}{2}$	..	4	$6\frac{1}{8}$	16
$1\frac{1}{2}$	2.45	9	14, 18	9	$3\frac{1}{2}$	10	$2\frac{3}{8}$	17.75	4	..	4	$6\frac{1}{8}$	$16\frac{1}{2}$
$1\frac{5}{8}$	2.80	9	..	9	$3\frac{3}{4}$	$10\frac{1}{2}$	$2\frac{1}{2}$	20.00	4	..	4	$6\frac{3}{8}$	17

PIPE TAPS AND REAMERS

STANDARD TAPER $\frac{1}{4}$ INCH PER FOOT

FIG. 164



FIG. 3822

WITH INSERTED LANDS
FOR SIZES LARGER THAN TWO INCHES

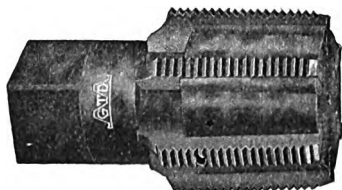


FIG. 3823

This type of pipe tap and reamer consists of a center or body, lands and wedges for securing the lands in place. The lands are made of a superior quality of steel.

New lands may be obtained to replace old ones at a mere fraction of cost of a new solid tap or reamer.

Taps of this type can be furnished in any size, pitch or thread not listed at special prices.

A high-grade pipe tap made from selected crucible tool steel.

Briggs Standard Right Hand Taper Pipe Taps are furnished unless otherwise specified.

Briggs Standard Left Hand Pipe Taps take a special discount from same list price as Right Hand Taps.

Straight (plug) Pipe Taps will be furnished at regular prices.

All other left hand Pipe Taps are special.

Sizes, lengths and pitches not listed are subject to special prices.

Reamers for Briggs Standard Pipe Taps will be furnished at the same prices as taps.

SIZES AND PRICES

Nominal Size Inches	Price Each	No. of Threads to the In.		Length of Thread Inches	Length Over All Inches
		Briggs Std.	Whitworth Std.		
$\frac{1}{8}$	\$1.00	27	28	$\frac{3}{4}$	$2\frac{1}{8}$
$\frac{1}{4}$	1.20	18	19	$1\frac{1}{8}$	$2\frac{1}{4}$
$\frac{3}{8}$	1.60	18	19	$1\frac{1}{8}$	$2\frac{1}{4}$
$\frac{1}{2}$	2.00	14	14	$1\frac{3}{8}$	$3\frac{1}{8}$
$\frac{5}{8}$	2.80	..	14	$1\frac{3}{8}$	$3\frac{1}{8}$
$\frac{3}{4}$	2.80	14	14	$1\frac{3}{8}$	$3\frac{1}{4}$
$\frac{7}{8}$	4.40	..	14	$1\frac{1}{2}$	$3\frac{1}{2}$
1	4.40	$11\frac{1}{2}$	11	$1\frac{3}{4}$	$3\frac{3}{4}$
$1\frac{1}{4}$	5.00	$11\frac{1}{2}$	11	$1\frac{3}{4}$	4
$1\frac{1}{2}$	6.60	$11\frac{1}{2}$	11	$1\frac{3}{4}$	$4\frac{1}{4}$
$1\frac{3}{4}$	8.00	..	11	$1\frac{3}{4}$	$4\frac{3}{8}$
2	10.00	$11\frac{1}{2}$	11	$1\frac{3}{4}$	$4\frac{1}{2}$
$2\frac{1}{4}$	12.00	..	11	$2\frac{1}{8}$	5
$2\frac{1}{2}$	15.00	8	11	$2\frac{1}{8}$	$5\frac{1}{2}$
$2\frac{3}{4}$	18.00	..	11	$2\frac{1}{8}$	$5\frac{3}{4}$
3	22.50	8	11	$2\frac{3}{8}$	6
$3\frac{1}{4}$	25.50	..	11	$2\frac{3}{8}$	$6\frac{1}{4}$
$3\frac{1}{2}$	30.00	8	11	$2\frac{1}{4}$	$6\frac{1}{2}$
$3\frac{3}{4}$	36.00	..	11	$2\frac{1}{4}$	$6\frac{3}{8}$
4	45.00	8	11	$2\frac{1}{4}$	$6\frac{3}{4}$

SPECIFY ALL TOOLS BY OUR LIST NUMBERS

TAPPER TAPS

NO. 307



FIG. 166

U. S. Threads furnished unless otherwise ordered.

Tapper Taps will be furnished with plain round, squared, flatted, Acme or National shanks at regular prices.

All others will be considered special.

S.A.E. and Whitworth Standard threads furnished at regular prices if specified.

All sizes, lengths and threads not listed are special, and subject to special prices.

Left hand threads are special.

We will furnish Tapper Taps from $\frac{1}{4}$ inch to 1 inch inclusive $\frac{1}{8}$ inch oversize in standard pitches only of the V form.

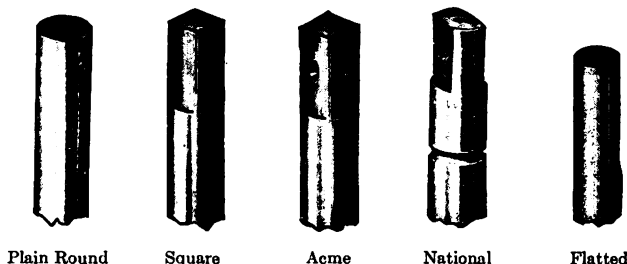


FIG. 3826

SIZES AND PRICES

Diam. of Tap In.	Length Over All—Price Each				Number of Threads to the Inch			Diam. of Tap In.	Length Over All—Price Each				Number of Threads to to the Inch		
	11 in.	12 in.	14 in.	15 in.	U. S. Std.	S.A.E. Std.	Whit- worth Std.		11 in.	12 in.	14 in.	15 in.	U.S. Std.	S.A.E. Std.	Whit- worth Std.
$\frac{1}{4}$	\$0.70	\$0.75	\$0.80	\$0.90	20	28	20	1	\$3.15	\$3.30	\$3.50	\$3.65	8	14	8
$\frac{5}{16}$	.80	.85	.90	1.00	18	24	18	$1\frac{1}{8}$	3.60	3.70	4.00	4.15	7	12	7
$\frac{3}{8}$	.90	.95	1.00	1.10	16	24	16	$1\frac{1}{4}$	4.20	4.50	4.90	5.10	7	12	7
$\frac{7}{16}$	1.00	1.05	1.15	1.25	14	20	14	$1\frac{3}{8}$	4.80	5.15	5.75	6.00	6	12	6
$\frac{1}{2}$	1.10	1.15	1.25	1.35	13	20	12	$1\frac{1}{2}$	5.75	6.25	7.05	7.35	6	12	6
$\frac{9}{16}$	1.30	1.35	1.45	1.55	12	18	12	$1\frac{5}{8}$	6.40	6.95	8.00	8.35	$5\frac{1}{2}$	..	5
$\frac{5}{8}$	1.45	1.50	1.65	1.75	11	18	11	$1\frac{3}{4}$	7.40	8.00	9.25	9.65	5	..	5
$\frac{11}{16}$	1.65	1.70	1.80	1.95	11	16	11	$1\frac{7}{8}$	8.25	8.90	10.15	10.75	5	..	$4\frac{1}{2}$
$\frac{3}{4}$	1.90	1.95	2.00	2.10	10	16	10	2	9.10	9.90	11.50	12.25	$4\frac{1}{2}$	..	$4\frac{1}{2}$
$\frac{7}{8}$	2.15	2.20	2.25	2.35	10	..	10								
$\frac{15}{16}$	2.45	2.50	2.60	2.75	9	14, 18	9								
1	2.80	2.90	3.00	3.15	9	..	9								

STAY BOLT TAPS

NO. 316



FIG. 168

In ordering Stay Bolt Taps, state diameter and number of threads to the inch; also length and dimensions of parts as indicated in cut by letters A, B, C, D, E.

All Stay Bolt Taps will be furnished with 12 threads to the inch, unless otherwise ordered.

U. S. Form, V Form and Whitworth Form thread furnished at the same list prices. U. S. S. threads furnished unless otherwise ordered.

Diameter given is that of the thread at its straight part.

Prices are for each inch of length 16 inches and upwards.

Taps shorter than 16 inches will be charged as if 16 inches long and fractions of an inch in length will be charged as a full extra inch.

We carry in stock Stay Bolt Taps in 20 and 24 inch lengths. All other lengths are special.

SIZES AND PRICES

Diam. of Tap Inches	Price per Inch	Diam. of Tap Inches	Price per Inch
$\frac{3}{4}$	\$0.40	$1\frac{3}{8}$	\$0.55
$\frac{15}{16}$	.40	$1\frac{1}{4}$	.55
$\frac{7}{8}$	.40	$1\frac{1}{2}$	.60
$\frac{15}{16}$	.45	$1\frac{3}{8}$	.60
1	.45	$1\frac{1}{4}$	.70
$1\frac{1}{8}$	.50	$1\frac{1}{2}$	.70
$1\frac{1}{8}$	.50		

SPECIFY ALL TOOLS BY OUR LIST NUMBERS

SPINDLE STAY BOLT TAPS

NO. 1410



FIG. 167

All taps have 12 threads to the inch and can be furnished in either United States Standard form or V form of thread.

U. S. S. form thread furnished unless otherwise specified.

Taps shorter than 8 inches will be charged as if 8 inches long, and fractions of an inch in length will be charged as a full extra inch.

Spindle Staybolt Taps having the following proportions are carried in stock for immediate shipment:

Length over all.....	7 $\frac{1}{8}$ inch
Length of fluted Thread.....	3 $\frac{1}{4}$ inch
Length of unfluted Thread.....	2 $\frac{3}{4}$ inch
Diameter of Spindle.....	$\frac{3}{8}$ inch
Length of Spindle.....	11 inch

SIZES AND PRICES

Dia. of Tap In.	Price		Diam. of Tap Inches	Price	
	For a Tap 7 $\frac{1}{8}$ " Long	Per Inch for Other Lengths		For a Tap 7 $\frac{1}{8}$ " Long	Per Inch for Other Lengths
$\frac{3}{4}$	\$8.00	\$1.00	1 $\frac{1}{8}$	\$10.80	\$1.35
$\frac{7}{8}$	8.40	1.05	1 $\frac{1}{4}$	11.20	1.40
$\frac{1}{2}$	8.80	1.10	1 $\frac{3}{8}$	11.60	1.45
$\frac{1}{4}$	9.20	1.15	1 $\frac{1}{2}$	12.00	1.50
1	9.60	1.20	1 $\frac{5}{8}$	12.40	1.55
1 $\frac{1}{8}$	10.00	1.25	1 $\frac{3}{4}$	12.80	1.60
1 $\frac{1}{4}$	10.40	1.30			

BOILER TAPS

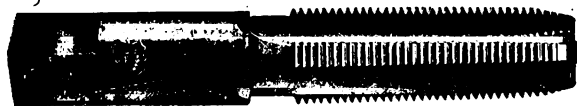
TAPER
NO. 317

FIG. 169

These Taps are furnished with 12 threads to the inch—U. S. or V form, as desired. U. S. S. Threads furnished unless otherwise ordered.

They are tapered $\frac{3}{4}$ inch per foot and the diameter is measured $\frac{5}{8}$ inch from the large end of the thread.

Sizes, lengths and threads not listed are subject to special prices.

Left hand taps are special.

SIZES AND PRICES

Diameter Inches	Price Each	Length Over All Inches	No. of Threads to the Inch
$\frac{1}{2}$	\$1.05	4 $\frac{1}{4}$	12
$\frac{5}{8}$	1.25	4 $\frac{5}{8}$	12
$\frac{3}{4}$	1.40	5	12
$\frac{7}{8}$	1.60	5 $\frac{1}{4}$	12
$\frac{1}{2}$	1.95	5 $\frac{1}{2}$	12
$\frac{1}{4}$	2.25	5 $\frac{3}{4}$	12
$\frac{1}{8}$	2.50	6	12
$\frac{1}{16}$	2.80	6 $\frac{1}{4}$	12
1	3.35	6 $\frac{1}{2}$	12
1 $\frac{1}{8}$	3.50	6 $\frac{3}{4}$	12
1 $\frac{1}{4}$	3.65	6 $\frac{7}{8}$	12
1 $\frac{3}{8}$	3.85	7	12
1 $\frac{1}{2}$	4.05	7 $\frac{1}{8}$	12
1 $\frac{3}{4}$	4.35	7 $\frac{1}{4}$	12
1 $\frac{5}{8}$	4.70	7 $\frac{3}{8}$	12
1 $\frac{7}{8}$	5.30	7 $\frac{1}{2}$	12
1 $\frac{1}{2}$	5.50	7 $\frac{5}{8}$	12
1 $\frac{3}{4}$	5.80	7 $\frac{3}{4}$	12
1 $\frac{1}{4}$	6.10	7 $\frac{1}{2}$	12
1 $\frac{1}{8}$	6.40	8	12
2	6.70	8	12

STRAIGHT
NO. 326

FIG. 171

These Taps are furnished with 12 threads to the inch—U. S. or V form, as desired. U. S. S. threads furnished unless otherwise ordered.

The reamer point can be used to size the hole for the thread, and as a gauge for the size of Drill to be used before tapping. Back of the reamer point the threads are slightly chamfered, but the full thread is straight.

Sizes, lengths and threads not listed are subject to special prices.

Left hand taps are special.

SIZES AND PRICES

Diameter Inches	Price Each	Length Over All Inches	No. of Threads to the Inch
$\frac{1}{2}$	\$1.05	4 $\frac{1}{4}$	12
$\frac{5}{8}$	1.25	4 $\frac{5}{8}$	12
$\frac{3}{4}$	1.40	5	12
$\frac{7}{8}$	1.60	5 $\frac{1}{4}$	12
$\frac{1}{2}$	1.95	5 $\frac{1}{2}$	12
$\frac{1}{4}$	2.25	5 $\frac{3}{4}$	12
$\frac{1}{8}$	2.50	6	12
$\frac{1}{16}$	2.80	6 $\frac{1}{4}$	12
1	3.35	6 $\frac{1}{2}$	12
1 $\frac{1}{8}$	3.50	6 $\frac{3}{4}$	12
1 $\frac{1}{4}$	3.65	6 $\frac{7}{8}$	12
1 $\frac{3}{8}$	3.85	7	12
1 $\frac{1}{2}$	4.05	7 $\frac{1}{8}$	12
1 $\frac{3}{4}$	4.35	7 $\frac{1}{4}$	12
1 $\frac{5}{8}$	4.70	7 $\frac{3}{8}$	12
1 $\frac{7}{8}$	5.30	7 $\frac{1}{2}$	12
1 $\frac{1}{2}$	5.50	7 $\frac{5}{8}$	12
1 $\frac{3}{4}$	5.80	7 $\frac{3}{4}$	12
1 $\frac{1}{4}$	6.10	7 $\frac{1}{2}$	12
1 $\frac{1}{8}$	6.40	8	12
2	6.70	8	12

SPECIFY ALL TOOLS BY OUR LIST NUMBERS

PATCH BOLT TAPS

NO. 318



FIG. 170

All taps have 12 threads to the inch and can be furnished in either U. S. Std. form or V form of thread.

These Taps are tapered $\frac{3}{4}$ inch per foot to make a steam-tight fit. Diameter given in size of Tap at about $\frac{5}{8}$ inch from large end of thread. U. S. S. Threads furnished unless otherwise ordered.

Sizes, lengths and threads not listed are subject to special prices.

Left hand taps are special.

SIZES AND PRICES

Dia. In.	Price Each	Length Over All Inches	No. of Threads to Inch	Diam. Inches	Price Each	Length Over All Inches	No. of Threads to Inch
$\frac{1}{2}$	\$1.00	3	12	$\frac{1}{4}$	\$2.40	$3\frac{1}{4}$	12
$\frac{3}{8}$	1.10	3	12	$\frac{1}{2}$	2.80	$3\frac{1}{2}$	12
$\frac{1}{2}$	1.25	3	12	$\frac{3}{4}$	2.90	$3\frac{1}{2}$	12
$\frac{3}{4}$	1.45	3	12	$1\frac{1}{8}$	3.00	$3\frac{1}{2}$	12
$1\frac{1}{8}$	1.70	3	12	$1\frac{1}{4}$	3.15	$3\frac{1}{2}$	12
$1\frac{1}{4}$	1.95	3	12	$1\frac{3}{4}$	3.35	$3\frac{1}{2}$	12
$1\frac{3}{4}$	2.25	3	12				

MUD PLUG OR WASHOUT TAPS

NO. 327

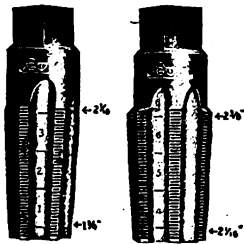


FIG. 172

FIG. 173

Used for tapping washout holes in locomotives.

A set consists of four taps having $1\frac{1}{4}$ inch taper in 12 inches.

Tap No. 1 is $1\frac{3}{4}$ inches in diameter at small end, and tap No. 4 is 3 inches in diameter at large end.

The taps are marked as shown in the illustrations and correspond with taper plugs bearing the same numbers as the twelve diameters shown in the four taps.

The taps are $6\frac{1}{2}$ inches long and all have the same size shank and square.

All taps have 12 threads to the inch, and can be furnished in either United States Standard form or V form of thread.

U. S. Std. threads furnished unless otherwise ordered.

Sizes, lengths and threads not listed are subject to special prices.

Left hand Taps are special.

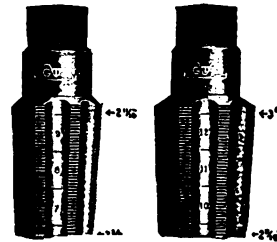


FIG. 174

FIG. 175

SIZES AND PRICES

No.	Capacity	For Plugs	Price Each
1	$1\frac{3}{4}$ " x $2\frac{1}{4}$ "	Nos. 1, 2, 3	\$ 7.60
2	$2\frac{1}{4}$ " x $2\frac{3}{8}$ "	Nos. 4, 5, 6	9.50
3	$2\frac{3}{8}$ " x $2\frac{1}{2}$ "	Nos. 7, 8, 9	12.50
4	$2\frac{1}{2}$ " x 3"	Nos. 10, 11, 12	14.45

ADJUSTABLE TAP AND REAMER WRENCHES

NOS. 00 TO 8

No.	Capacity (Tap Sizes)				Weight	Price Each
	Hand Inclusive Inches	Machine Screw Inclusive	Pipe Inclusive Inches	Full Length Inches		
00	$\frac{1}{16}$ to $\frac{3}{16}$	0 to 13	.....	Handle	1½ oz.	\$1.25
0	$\frac{1}{16}$ to $\frac{1}{4}$	0 to 18	.....	5	4 oz.	1.50
4	$\frac{1}{16}$ to $\frac{3}{8}$	0 to 24	$\frac{1}{8}$	9	7 oz.	1.75
5	$\frac{1}{16}$ to $\frac{1}{2}$	10 to 30	$\frac{1}{8}$ to $\frac{1}{4}$	11	12 oz.	2.00
6	$\frac{1}{4}$ to $\frac{3}{4}$	14 to 30	$\frac{1}{8}$ to $\frac{3}{8}$	15	2 lbs.	2.50
7	$\frac{3}{8}$ to 1	15 to 30	$\frac{1}{8}$ to $\frac{3}{4}$	19	3½ lbs.	3.50
7½	$\frac{3}{8}$ to 1½	22 to 30	$\frac{1}{4}$ to $\frac{3}{4}$	31	4½ lbs.	6.50
8	$\frac{3}{4}$ to 1½	.....	$\frac{3}{8}$ to 1	40	8 lbs.	8.00

NOS. 329 TO 337

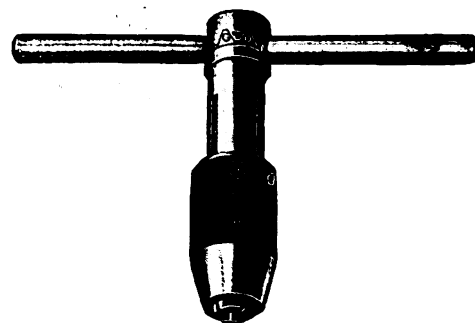
No.	Hand Inclusive Inches	Machine Screw Inclusive	Pipe Inclusive Inches	* Shank	Weight	Price Each
329	$\frac{1}{16}$ to $\frac{3}{16}$	0-18	.....	2½	3 oz.	.50
333	$\frac{1}{16}$ to $\frac{1}{2}$	14-30	$\frac{1}{8}$	3½	8 oz.	1.00
336	$\frac{1}{16}$ to $\frac{3}{16}$	0-18	.....	8¾	8 oz.	.75
337	$\frac{1}{16}$ to $\frac{1}{2}$	14-30	$\frac{1}{8}$	10½	1½ lbs.	1.50

*Length from center of T handle to bottom of chuck.

G.T.D. Adjustable Tap Wrenches will hold both Hand and Pipe Taps.

Adjustment is obtained by revolving one of the handles.

The jaws are made of fine tool steel, are rigidly held in place, and give a tight, strong grip.



T Style NOS. 329 AND 337 FIG. 178

"YANKEE" RATCHET TAP WRENCH

NOS. 250, 251 AND 1251

Right and Left Hand and Rigid

The distinguishing features are its adaptability, convenience, and efficiency for working in close quarters, corners, and inaccessible places.

The ratchet mechanism is the same construction used in other "Yankee" Tools. With the shifter at top, it is left hand; at bottom, right hand; and in center, rigid, as ordinary Tap Wrench.

The crossbar is held central by a friction device and of ample leverage for even larger taps than the chuck will hold.

A knurled thumb piece at top of Wrench affords a ready means of starting in and backing out the tap quickly. In the end of this thumb piece is a countersunk hole to use Tap Wrench on lathe center when desired, for holding small drills, etc.

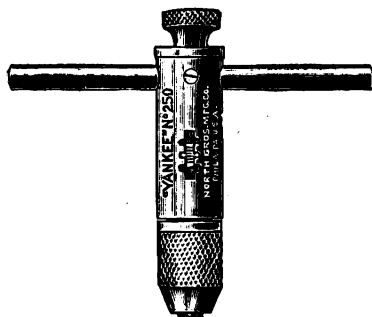
The cross arm can be readily withdrawn, so that little room is taken up in tool chest or drawer.

The ratchet and pawls are made of tool steel, hardened and tempered. The chuck has hardened steel jaws.

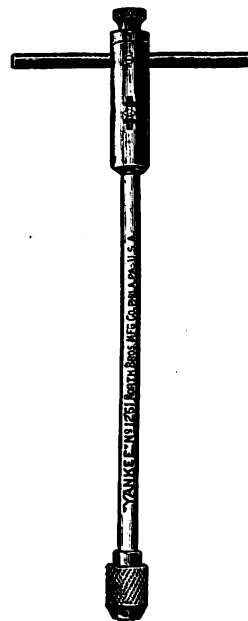
No. 250 Holds up to $\frac{1}{8}$ in. Taps, outside diameter of chuck $\frac{3}{4}$ in.; length over all, 3¼ in. Price each, \$2.40.

No. 251 Holds up to $\frac{1}{8}$ in. Taps, outside diameter of chuck $\frac{1}{8}$ in.; length over all, 5 in. Price each, \$2.80

No. 1251 Same as No. 251, except length over all is 13 in. for work in steel cars, etc., and where long reach is necessary. Price each, \$3.40.



NO. 250 FIG. 177



NO. 1251 FIG. 179

ALERT HIGH SPEED TAP WRENCHES

GUN METAL FINISH

With the thumb and finger you can back a tap out of the work in one-fourth of the time taken with the old time wrench.

Resting the thumb piece in the palm of the hand gives a better hold on the wrench, resulting in better work and fewer broken tips and spoiled work.

Jaws are broached square on the inside, giving a firm grip on any tap within its capacity.

They are made of a high grade of tool steel, properly tempered, so that they will always open and close to fit the different diameters of taps.

The closing sleeve is made of best quality machinery steel, case-hardened.

The extra long lengths in which these wrenches can be supplied (see list) are an entirely new thing on the market, and are filling a long felt want, as it is not now necessary to buy taps with long shanks. All that is required is the regular hand tap and a set of long tap wrenches.

For pulleys and similar work, where it is not desired to drill so large a hole, style X with square shank can be supplied. These are regularly made in the 12 inch length, but other lengths can be furnished to order.

PRICE LIST

No.	Length over all inches	Capacity Inches	Price each
4	2 3/4	1/8 to 3/8	\$.60
4 A	6 3/4	1/8 " 3/8	.90
5	3 1/2	1/8 " 5/8	.75
5 A	7	1/8 " 3/8	1.25
5 B	13	1/8 " 3/8	1.50
5 X	13	1/8 " 3/8	1.50
6	4 5/8	1/8 " 1/2	1.25
6 A	7 1/4	1/8 " 1/2	1.75
6 B	13 1/4	1/8 " 1/2	2.00
6 X	13 1/4	1/8 " 1/2	2.00



FIG. 180



STYLE X FOR PULLEYS, ETC.—FIG. 180 1/2

ALERT RATCHET TAP WRENCH

The Alert Wrench will hand tap and ream in corners and inaccessible places where heretofore it was necessary to resort to all kinds of makeshifts—pliers, socket wrenches, S Wrenches, making up special tap or reamer holders from drill rod or cold rolled steel by drilling a hole in the end of the rod to take shank of tap or reamer and pinning the two members together. The tool is universal in character, being often used by many mechanics as a pin vise, screw driver, socket wrench, etc. Combines the rigidity of a solid tool with the flexibility of the ratchet without removing hand from natural tapping position. Either is obtained instantly as wanted. No adjusting by pin or pawl. Gives the natural hold for tapping. Thumb rest is centered for use on dead centre of a lathe. Very fine or coarse feeds instantly obtainable. Absolutely nothing to get out of order. Knurled upper sleeve permits quick and accurate starting of taps, also quick backing out of taps from work to one-fourth the time required by old-style tap wrenches. Jaws are broached square on the inside to insure firm gripping and true chucking of the tap. Jaws are specially heat treated and properly tempered so that they will always open and close to fit the different diameters of taps. Wrench is made to limit gauges and every part carefully inspected. All exposed parts are polished and have a blue finish to prevent corrosion and present a neat appearance.

To operate the ratchet arrangement, simply rest the thumb or palm of the hand on nut (thumb rest) at top of wrench and pull cross bar by the fingers towards

the nut, which action disengages the pinion of male gear from internal or female gear, and while in this position turn in the desired direction for fine or coarse feed. Release pressure on cross bar and the gears mesh (making the ratchet a solid rigid wrench); now turn (for tapping) to the limit of feed space.

Repeat above movement until hole is tapped.

To change position of cross bar for either corner or open work, unscrew nut (thumb rest) at top of wrench by turning to the left. Then remove spring and take off upper sleeve and cross bar.

Move cross bar over to required hole (either through centre or end) in line with the hole in upper sleeve, put on body, replace spring and screw on nut.

PRICE LIST

No. 1.	Length over all 3"	Capacity 1/8" to 1/4"	Price each, \$2.00
No. 2.	Length over all 3 3/4"	Capacity 1/8" to 1/4"	Price each, 2.00
No. 3.	Length over all 5 1/4"	Capacity 1/8" to 1/4"	Price each, 2.50

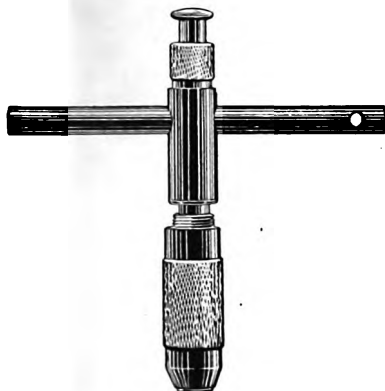


FIG. 181

MILLING CUTTERS

ORDERS

To insure a correct understanding of what is wanted always specify tools by the name and list number as shown in catalogue. Carbon Steel Cutters will be sent unless High Speed Steel is specified.

FORMED CUTTERS

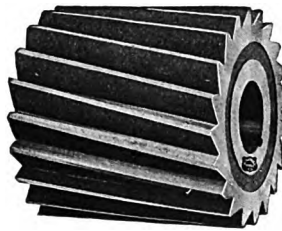
For Formed Cutters of irregular shape send template or drawing showing exact form required and full dimensions.

SPECIAL MILLING CUTTERS

When ordering or making inquiries for special Cutters, refer to catalogue number for style of Cutter desired, also give the following information: Diameter, width of face, whether straight or spiral flutes, diameter of hole and size of keyway. For Angular Mills, End Mills, Facing Mills and T-Slot Cutters, state whether right or left hand tools are wanted.

PLAIN MILLING CUTTERS

NO. 139 CARBON STEEL



NO. 700 HIGH SPEED STEEL

FIG. 193

Diameter Inches	Width of Face Inches	Hole Inches	Price Each		Diameter Inches	Width of Face Inches	Hole Inches	Price Each	
			Carbon Steel	High Speed Steel				Carbon Steel	High Speed Steel
2 1/4	1/2	7/8	\$2.25	\$2.85	2 3/4	1 1/4	1	\$4.35	\$ 6.10
2 1/4	1	7/8	3.20	4.55	2 3/4	1 1/2	1	4.80	6.80
2 1/4	1 1/4	7/8	4.20	5.80	2 3/4	2	1	5.35	7.95
2 1/2	1 1/8	1	1.65	2.10	2 3/4	2 1/2	1	5.85	9.00
2 1/2	1 1/4	1	1.80	2.30	2 3/4	3	1	6.40	10.00
2 1/2	1 1/2	1	2.00	2.55	2 3/4	4	1 1/4	7.65	12.65
2 1/2	1 3/8	1	2.10	2.65	3	1 1/8	1	1.75	2.35
2 1/2	1 1/2	1	2.20	2.80	3	1 1/4	1	2.10	2.75
2 1/2	1 1/2	1	2.30	3.00	3	1 1/2	1	2.35	3.20
2 1/2	1 1/2	1	2.40	3.20	3	1 3/8	1	2.70	3.55
2 1/2	1 3/4	1	2.45	3.45	3	1 3/8	1 1/4	2.70	3.55
2 1/2	1 3/4	1	2.65	3.55	3	1 1/2	1 1/4	2.85	3.85
2 1/2	1 3/4	1	2.80	3.80	3	1 1/2	1 1/4	3.10	4.10
2 1/2	1 3/4	1	2.90	4.00	3	1 1/2	1 1/4	3.25	4.40
2 1/2	1 3/4	1	3.10	4.15	3	1 1/2	1 1/4	3.45	4.70
2 1/2	1	1	3.30	4.55	3	1 1/2	1 1/4	3.85	5.20
2 1/2	1 1/4	1	3.70	5.15	3	1 1/2	1 1/4	4.20	5.75
2 1/2	1 1/2	1	4.00	5.65	3	1 1/2	1 1/4	4.55	6.35
2 1/2	1 1/2	1	4.35	6.30	3	1 1/2	1 1/4	5.10	7.20
2 1/2	1 1/2	1	4.75	6.90	3	1 1/2	1 1/4	5.45	7.85
2 1/2	2 1/2	1	5.25	7.85	3	1 3/4	1 1/4	5.70	8.45
2 1/2	3	1	5.70	8.80	3	2	1 1/4	6.00	9.00
2 1/2	4	1	7.00	11.00	3	2 1/2	1 1/4	6.60	10.35
2 3/4	1 1/8	1	1.75	2.20	3	3	1 1/4	7.00	11.20
2 3/4	1 1/4	1	2.00	2.50	3	3 1/2	1 1/4	7.50	12.50
2 3/4	1 1/2	1	2.10	2.70	3	4	1 1/4	8.15	13.80
2 3/4	1 3/8	1	2.30	2.90	3	5	1 1/4	9.90	16.90
2 3/4	1 1/2	1	2.35	3.20	3	6	1 1/4	13.70	22.15
2 3/4	1 1/2	1	2.40	3.30	3 1/2	1 1/8	1	1.85	2.65
2 3/4	1 3/4	1	2.55	3.55	3 1/2	1 1/4	1	2.20	3.10
2 3/4	1 3/4	1	2.70	3.90	3 1/2	1 1/2	1	2.65	3.65
2 3/4	1 3/4	1	3.20	4.35	3 1/2	1 3/8	1	3.10	4.25
2 3/4	1 3/4	1	3.65	4.95	3 1/2	1 1/2	1	3.50	4.40
2 3/4	1	1	4.00	5.35	...	...	...	...	...

Continued on Page 61

Continued from Page 60.

PLAIN MILLING CUTTERS

Diameter Inches	Width of Face Inches	Hole Inches	Price Each		Diameter Inches	Width of Face Inches	Hole Inches	Price Each	
			Carbon Steel	High Speed Steel				Carbon Steel	High Speed Steel
3 1/2	1/2	1 1/4	\$ 4.00	\$ 5.45	4	1 1/4	1 1/4	\$ 7.90	\$11.60
3 1/2	5/8	1 1/4	4.40	6.05	4	1 1/4	1 1/2	7.90	11.60
3 1/2	3/4	1 1/4	4.90	6.80	4	1 1/2	1 1/4	8.40	12.70
3 1/2	7/8	1 1/4	5.55	7.70	4	1 1/2	1 1/2	8.40	12.70
3 1/2	1	1 1/4	6.10	8.25	4	1 3/4	1 1/4	9.00	13.70
3 1/2	1 1/2	1 1/4	7.10	10.00	4	1 3/4	1 1/2	9.00	13.70
3 1/2	2	1 1/4	8.15	12.30	4	2	1 1/4	9.45	14.85
3 1/2	2 1/2	1 1/4	8.75	13.80	4	2	1 1/2	9.45	14.85
3 1/2	3	1 1/4	9.40	15.35	4	3	1 1/4	11.45	19.10
3 1/2	3 1/2	1 1/4	10.35	16.70	4	3	1 1/2	11.45	19.10
3 1/2	4	1 1/4	11.60	19.30	4	4	1 1/4	14.00	23.95
3 1/2	4	1 1/2	11.60	19.30	4	4	1 1/2	14.00	23.95
4	1/4	1	2.60	3.80	4	5	1 1/2	17.10	28.95
4	1/4	1 1/4	2.60	3.80	4	6	1 1/2	19.65	34.45
4	5/8	1	3.20	4.55	4 1/2	1 1/2	2	5.10	7.50
4	3/4	1 1/4	3.20	4.55	4 1/2	5/8	2	5.60	8.60
4	7/8	1	3.85	5.35	4 1/2	3/4	2	6.10	9.60
4	1	1 1/4	3.85	5.35	4 1/2	7/8	2	6.70	10.50
4	1 1/4	1 1/4	4.45	6.15	4 1/2	1	2	7.50	11.55
4	1 1/2	1 1/4	5.00	6.85	4 1/2	1 1/4	2	8.60	13.00
4	1 3/4	1 1/4	5.20	7.25	4 1/2	1 1/2	2	9.50	14.60
4	2	1 1/4	5.45	7.65	4 1/2	1 3/4	2	10.45	16.30
4	2 1/4	1 1/4	6.00	8.45	4 1/2	2	2	10.80	18.00
4	2 1/2	1 1/4	6.55	9.30	4 1/2	6	2	24.70	45.10
4	1	1 1/4	7.15	10.25					
4	1	1 1/2	7.15	10.25					

Cutters of 3/4 inch face and over, are made with spiral teeth.

PLAIN MILLING CUTTERS WITH NICKED TEETH

SQUARE OR HALF-ROUND KEYWAY

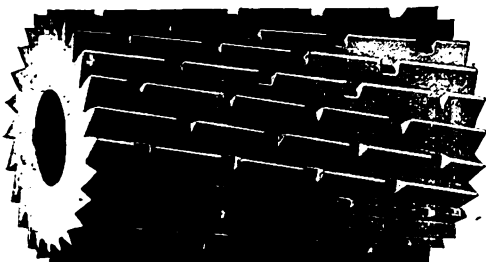


FIG. 193 1/4

Cutters of this form are especially adapted for the heavier class of milling. The teeth being nicked the chip is broken, thus enabling a heavier cut to be taken than would be possible with the ordinary milling cutter.

Regular or coarse tooth plain milling cutters can be furnished with nicked teeth. Prices upon application.

PLAIN MILLING CUTTERS WITH COARSE TEETH

NO. 800—HIGH SPEED STEEL

Coarse Tooth Cutters have approximately only one-half the number of teeth of regular Milling Cutters, and their chip space is about four times as great. They can be used with very fast feeds, and are especially adapted for use on modern heavy duty milling machines.

Cutters of less than 3/4 inch face have straight teeth. Cutters of 3/4 inch face and over have spiral teeth.

Coarse Tooth Plain Milling Cutters of carbon steel are special.

Prices upon application.

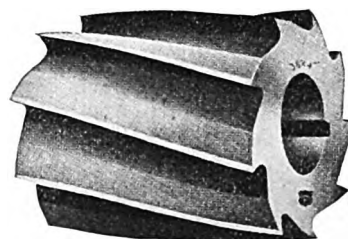


FIG. 3827

"WHITNEY" MACHINE KEYS AND KEY SEAT CUTTERS

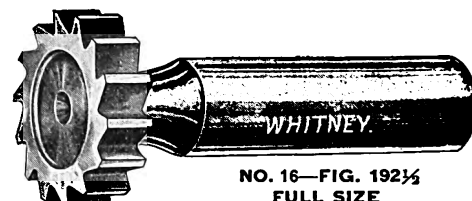
FOR THE "WOODRUFF SYSTEM OF KEYING"

KEY SEAT MILLING CUTTERS



FIG. 191 1/2

High speed cutters. While we are prepared to furnish these cutters either Carbon or of High Speed Steel, we urgently recommend the use of the latter, as experience has proved that they are far more efficient than Carbon Cutters if run at the proper speed and feed.



NO. 16—FIG. 192 1/2
FULL SIZE

Keys and Cutters correspond in size and number with the following exceptions.

For Key No. 121 use No. A Cutter

For Key No. 129 use No. 29 Cutter

" " " 141	" " 15	" " " RX	" " " R
" " " 131	" " B	" " " SX	" " " S
" " " 161	" " C	" " " TX	" " " T
" " " 126	" " 26	" " " UX	" " " U
" " " 127	" " 27	" " " VX	" " " V
" " " 128	" " 28		

WHITNEY KEYS

Regular carbon keys are made from a special quality of carbon steel and the nickel steel keys are made from a fine quality of nickel steel properly treated to give the maximum strength. Whitney Keys reach deep into the shaft, being firmly embedded and therefore capable of standing great strain. It is impossible for keys to roll over in their seat, as is often the case with ordinary keys.

When it is necessary to put a nut on the end of the shaft the threads may be cut full size. The keys will rock in their seats and adjust themselves perfectly to the angular spline, thus giving a bearing throughout their entire length.

PRICE LIST OF KEYS AND CUTTERS

Key & Cutter No.	Size Inches	Price, Keys per Hundred		Price Cutters Each		Thickness of Keys in Thousandths	Key & Cutter No.	Size Inches	Price, Keys per Hundred		Price Cutters Each		Thickness of Keys in Thousandths
		Machinery Steel	Nickel Steel	Carbon Steel	High Speed Steel				Machinery Steel	Nickel Steel	Carbon Steel	High Speed Steel	
1	1/2 x 1/8	\$1.76	\$2.40	\$1.28	\$1.92	.0625	24	1 1/2 x 1/4	\$5.26	\$7.78	\$2.88	\$6.34	.250
2	1/2 x 1/8	1.80	2.46	1.28	1.92	.0937	25	1 1/2 x 1/8	5.44	8.42	2.88	6.34	.3125
3	1/2 x 1/8	1.86	2.52	1.28	1.92	.125	G	1 1/2 x 3/8	5.62	9.06	2.88	6.34	.375
4	5/8 x 1/8	1.88	2.56	1.44	2.24	.0937	126	2 1/8 x 1/8	3.94	5.34	2.80	5.68	.1875
5	5/8 x 1/8	1.94	2.68	1.44	2.24	.125	127	2 1/8 x 1/4	4.10	5.80	2.80	6.00	.250
6	5/8 x 1/8	1.98	2.76	1.44	2.24	.1562	128	2 1/8 x 1/8	4.26	6.28	2.94	6.16	.3125
7	3/4 x 1/8	2.06	2.86	1.60	2.56	.125	129	2 1/8 x 3/8	4.42	6.76	3.08	6.48	.375
8	3/4 x 1/8	2.12	2.98	1.60	2.56	.1562	26	2 1/8 x 1/8	5.52	7.26	2.80	5.68	.1875
9	3/4 x 1/8	2.18	3.12	1.60	2.56	.1875	27	2 1/8 x 1/4	5.76	7.88	2.80	6.00	.250
10	7/8 x 1/8	2.58	3.52	1.84	3.14	.1562	28	2 1/8 x 1/8	6.00	8.50	2.94	6.16	.3125
11	7/8 x 1/8	2.64	3.68	1.84	3.14	.1875	29	2 1/8 x 3/8	6.24	9.14	3.08	6.48	.375
12	7/8 x 1/8	2.68	3.82	1.84	3.14	.2187	RX	2 3/4 x 1/4	5.88	8.78	3.28	6.96	.250
A	7/8 x 1/4	2.74	3.96	1.84	3.14	.250	SX	2 3/4 x 1/8	6.16	9.54	3.68	7.76	.3125
13	1 x 1/8	3.00	4.16	2.08	3.76	.1875	TX	2 3/4 x 3/8	6.44	10.30	4.00	8.40	.375
14	1 x 1/8	3.06	4.32	2.08	3.76	.2187	UX	2 3/4 x 1/8	6.74	11.08	4.28	8.96	.250
15	1 x 1/4	3.10	4.48	2.08	3.76	.250	VX	2 3/4 x 1/4	7.02	11.84	4.48	9.44	.3125
B	1 x 1/8	3.22	4.84	2.08	3.76	.3125	R	2 3/4 x 1/4	5.92	11.02	3.28	6.96	.375
16	1 1/8 x 1/8	3.50	4.80	2.32	4.42	.1875	S	2 3/4 x 1/8	6.24	11.06	3.68	7.76	.4375
17	1 1/8 x 1/8	3.56	5.00	2.32	4.42	.2187	T	2 3/4 x 3/8	6.56	12.00	4.00	8.40	.500
18	1 1/8 x 1/4	3.64	5.22	2.32	4.42	.250	U	2 3/4 x 1/8	6.88	13.04	4.28	8.96	.250
C	1 1/8 x 1/8	3.78	5.64	2.32	4.42	.3125	V	2 3/4 x 1/2	7.20	14.04	4.48	9.44	.3125
19	1 1/4 x 1/8	4.12	5.60	2.56	5.12	.1875	30	3 1/2 x 3/8	8.10	16.10	4.80	10.72	.375
20	1 1/4 x 1/8	4.20	5.86	2.56	5.12	.2187	31	3 1/2 x 1/8	8.46	17.46	5.40	11.52	.4375
21	1 1/4 x 1/4	4.28	6.10	2.56	5.12	.250	32	3 1/2 x 1/2	8.82	18.82	6.14	13.20	.500
D	1 1/4 x 1/8	4.42	6.56	2.56	5.12	.3125	33	3 1/2 x 3/8	9.18	20.18	6.80	14.48	.5625
E	1 1/4 x 3/8	4.58	7.06	2.56	5.12	.375	34	3 1/2 x 3/8	9.54	21.54	6.80	14.48	.625
22	1 3/8 x 1/4	4.80	6.94	2.88	6.06	.250	35	3 1/2 x 1/2	11.90	22.90	7.34	15.92	.6875
23	1 3/8 x 1/8	4.94	7.48	2.88	6.06	.3125	36	3 1/2 x 3/4	10.26	24.26	7.34	15.92	.750
F	1 3/8 x 3/8	5.10	8.02	2.88	6.06	.375	..	.....	.....	.....	.....	.....	.....

Cutters Nos. 126 to 129, inclusive, and Nos. 26 to 29 inclusive, are side mill type, with 3/4-inch hole. Cutters RX to No. 36, inclusive, are side mill type with 1-inch hole as shown in Fig. 194, page 63.

For Keyseaters of larger capacities see page No. 808.

ARBORS AND COLLETS

FOR "WHITNEY" MACHINE KEYS AND KEY SEAT CUTTERS
FOR THE "WOODRUFF SYSTEM OF KEYING"

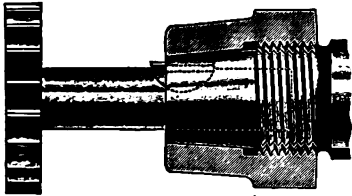


FIG. 3828

The above cut shows clearly how a cutter may be prevented from turning or slipping in the spring collet by fitting a No. 2 "Whitney" key into the shank. For the larger sizes of shank cutters the keys are frequently an advantage. We will furnish cutters with keys fitted at a small advance over the regular price.

Tapers regularly furnished: B. & S. Nos. 7, 8, 9 and 10 and Morse No. 3.

ARBORS

for holding Cutters, with $\frac{3}{4}$ inch, $\frac{1}{2}$ inch and 1 inch standard holes.

SPRING COLLETS

for holding Cutters with straight shanks, $\frac{1}{2}$ inch diameter.

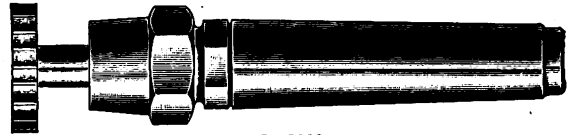


FIG. 3829

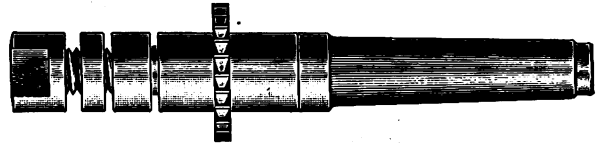


FIG. 3830

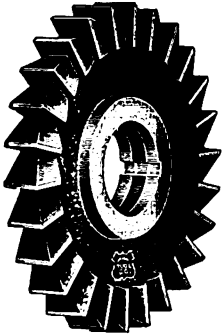


FIG. 194

SIDE MILLING CUTTERS

NO. 141 CARBON STEEL

NO. 702 HIGH SPEED STEEL

Carbon Steel Cutters will be furnished unless High Speed is specified.

These Mills, having teeth on both sides and face, are suitable for milling the sides of Nuts, Bolt Heads and similar work. Always specify the size of the hole wanted.

Diameter Inches	Width of Face Inches	Hole Inches	Price Each		Diameter Inches	Width of Face Inches	Hole Inches	Price Each	
			Carbon Steel	High Speed Steel				Carbon Steel	High Speed Steel
2	$\frac{1}{8}$	$\frac{1}{8}$	\$2.35	\$2.80	4	$\frac{1}{2}$	1	\$ 6.50	\$ 8.55
2	$\frac{1}{8}$	$\frac{5}{8}$	2.35	2.80	4	$\frac{1}{2}$	$1\frac{1}{4}$	6.50	8.55
2	$\frac{1}{4}$	$\frac{1}{2}$	2.60	3.00	4	$\frac{5}{8}$	1	7.10	9.45
2	$\frac{1}{4}$	$\frac{5}{8}$	2.60	3.00	4	$\frac{5}{8}$	$1\frac{1}{4}$	7.10	9.45
2	$\frac{3}{8}$	$\frac{1}{2}$	2.80	3.25	4	$\frac{3}{4}$	1	7.65	10.40
2	$\frac{3}{8}$	$\frac{5}{8}$	2.80	3.25	4	$\frac{3}{4}$	$1\frac{1}{4}$	7.65	10.40
2 1/2	$\frac{1}{4}$	$\frac{1}{8}$	2.80	3.30	4	$\frac{7}{8}$	1	8.25	11.35
2 1/2	$\frac{1}{4}$	$\frac{1}{8}$	2.90	3.60	4	$\frac{7}{8}$	$1\frac{1}{4}$	8.25	11.35
2 1/2	$\frac{1}{4}$	$\frac{1}{8}$	3.15	3.70	5	$\frac{1}{2}$	1	6.70	9.80
2 1/2	$\frac{1}{4}$	$\frac{1}{8}$	3.25	3.85	5	$\frac{1}{2}$	$1\frac{1}{4}$	6.70	9.80
2 1/2	$\frac{1}{2}$	$\frac{1}{8}$	3.40	4.10	5	$\frac{5}{8}$	1	7.30	11.00
2 1/2	$\frac{1}{2}$	$\frac{1}{8}$	2.90	3.55	5	$\frac{5}{8}$	$1\frac{1}{4}$	7.30	11.00
2 1/2	$\frac{1}{2}$	$\frac{1}{8}$	3.20	3.80	5	$\frac{3}{4}$	1	8.10	12.45
2 1/2	$\frac{1}{2}$	$\frac{1}{8}$	3.40	4.00	5	$\frac{3}{4}$	$1\frac{1}{4}$	8.10	12.45
2 1/2	$\frac{1}{2}$	$\frac{1}{8}$	3.50	4.35	5	$\frac{7}{8}$	1	8.75	13.65
2 1/2	$\frac{1}{2}$	$\frac{1}{8}$	3.50	4.35	5	$\frac{7}{8}$	$1\frac{1}{4}$	8.75	13.65
2 1/2	$\frac{1}{2}$	1	3.60	4.45	5	1	1	9.90	15.05
2 1/2	$\frac{1}{2}$	$\frac{1}{8}$	3.60	4.45	5	1	$1\frac{1}{4}$	9.90	15.05
3	$\frac{1}{4}$	1	3.15	3.85	6	$\frac{1}{2}$	1	8.55	12.25
3	$\frac{1}{4}$	1	3.50	4.35	6	$\frac{1}{2}$	$1\frac{1}{4}$	8.55	12.25
3	$\frac{1}{4}$	1	3.85	4.75	6	$\frac{5}{8}$	$1\frac{1}{4}$	9.10	13.80
3	$\frac{1}{4}$	1	4.10	5.10	6	$\frac{3}{4}$	1	9.65	15.35
3	$\frac{1}{2}$	1	4.30	5.40	6	$\frac{3}{4}$	$1\frac{1}{4}$	9.65	15.35
3	$\frac{1}{2}$	$1\frac{1}{4}$	4.30	5.40	6	$\frac{7}{8}$	$1\frac{1}{4}$	10.25	16.90
3 1/2	$\frac{1}{4}$	1	4.80	5.75	6	1	1	11.00	18.55
3 1/2	$\frac{1}{2}$	1	5.35	6.95	6	1	$1\frac{1}{4}$	11.00	18.55
3 1/2	$\frac{1}{2}$	1	5.55	7.65	6	1	$1\frac{1}{2}$	11.00	18.55
3 1/2	$\frac{1}{2}$	1	5.80	7.65	7	$\frac{3}{4}$	$1\frac{1}{4}$	17.60	23.85
4	$\frac{1}{4}$	1	3.70	5.05	7	1	$1\frac{1}{4}$	20.40	28.95
4	$\frac{3}{8}$	1	5.15	6.85	8	1	$1\frac{1}{4}$	24.75	37.30
4	$\frac{1}{2}$	$1\frac{1}{4}$	5.15	6.85					

SPECIFY ALL TOOLS BY OUR LIST NUMBERS

COARSE TOOTH SIDE MILLING CUTTERS

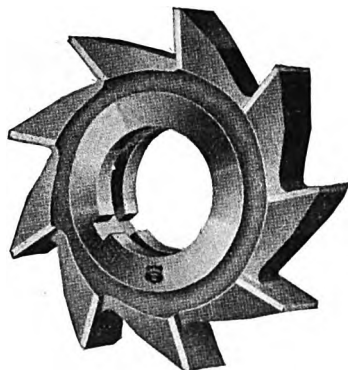


FIG. 3831

HIGH SPEED STEEL

NO. 820

These Cutters are made of high speed steel and are especially adapted for use on modern heavy duty milling machines. They are made in diameters from 2½ inches to 8 inches and with faces from ¼ inch to 1 inch. They can also be furnished of carbon steel, but this is considered special and furnished on special order only. Prices upon application.

MILLING CUTTERS WITH INSERTED TEETH

These Cutters are made with steel bodies and with high speed steel inserted teeth. They are made especially for high power millers, plain, universal and vertical, having either threaded or flanged spindle. In ordering cutters for machines having threaded spindle specify outside diameter and pitch of thread and whether cutter is to fit either single or multiple threaded spindle and make of machine.

When ordering cutters for machines having flanged spindles always specify make of machine.

When cutters are required for machines made by the Cincinnati Milling Machine Company always state whether screws and wrenches are required. Prices on application.

In ordering screws and wrenches always specify size and type of cutter.

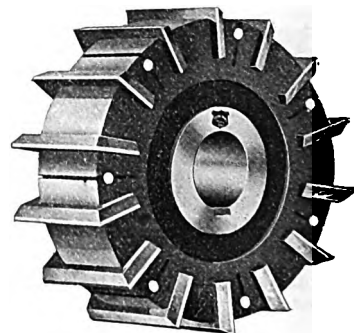


FIG. 3832

CONVEX AND CONCAVE CUTTERS

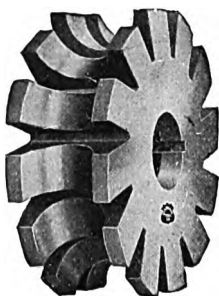


CONVEX

FIG. 198

NO. 142 CARBON STEEL
NO. 720 HIGH SPEED STEEL

FOR
MILLING
HALF
CIRCLES



CONCAVE

FIG. 199

NO. 142A CARBON STEEL
NO. 721 HIGH SPEED STEEL

The above Cutters can be sharpened without changing their outline.

Diam. Circle Inches	Diam. Cutter Inches	Hole Inches	Carbon Steel Cutters		High Speed Cutters	
			Price Convex Cutter	Price Concave Cutter	Price Convex Cutter	Price Concave Cutter
1/8	2	1/8	\$2.10	\$3.35	\$3.15	\$5.00
1/8	2	1/8	2.45	3.50	3.70	5.35
1/4	2	1/8	3.10	3.80	4.75	5.70
1/4	2 1/4	1/8	3.35	4.10	5.10	6.20
3/8	2 1/4	1/8	3.45	4.25	5.25	6.40
1/2	2 1/4	1/8	3.60	4.50	5.45	6.85
1/2	2 1/4	1/8	3.80	4.80	5.70	7.30
5/8	2 3/4	1	4.65	6.00	7.00	9.00
3/4	3	1	5.50	7.00	8.35	10.60
7/8	3 1/4	1	6.45	8.00	9.75	12.10
1	3 1/4	1	7.00	8.15	10.50	12.40
1 1/8	4	1 1/4	9.35	10.80	14.20	16.35
1 1/4	4	1 1/4	9.65	11.40	14.65	17.25
1 3/8	4 1/4	1 1/4	10.70	12.85	16.20	19.45
1 1/2	4 1/4	1 1/4	11.00	13.90	16.75	21.10

INVOLUTE GEAR CUTTERS

FOR TEETH OF GEAR WHEELS

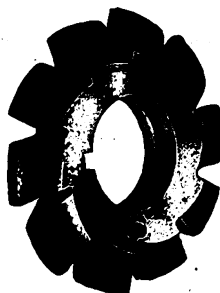


FIG. 207

All gears of same pitch cut with these Cutters will interchange. These cutters can be sharpened by grinding the faces of the teeth, without changing their form.

It is necessary to specify not only the pitch, but also the number of involute gear cutters. There are eight numbers for every pitch. If gear cutters are to cut an exact number of teeth, this must be stated.

COMPARATIVE CURVES OF INVOLUTE CUTTERS FOR THE TEETH OF GEAR WHEELS

When extreme accuracy is required, an individual cutter should be used for each size of gear wheel. However, careful experiment has shown that a set of eight properly selected cutters will cut all gears ranging in size from twelve teeth to a rack, and give good results.

The diagram shows how the curves vary in the eight different cutters that are required to make a complete set for any one pitch. All gears, of the same pitch, cut with these cutters will be interchangeable, but a cutter should never be used for any gear other than those included in the range which it is designed to cut.

Eight Cutters are made for each pitch, as follows:
No. 1 will cut Wheels from 135 teeth to a rack.

2	"	"	55	"	134 teeth.
3	"	"	35	"	54 "
4	"	"	26	"	34 "
5	"	"	21	"	25 "
6	"	"	17	"	20 "
7	"	"	14	"	16 "
8	"	"	12	"	13 "

In ordering, give the Number of Cutter and Diametral Pitch required.

Each Cutter is marked with Number, Diametral Pitch and Number of Teeth for which it is adapted.

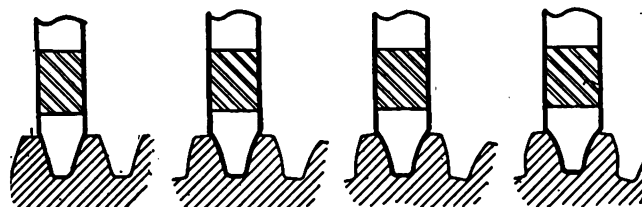
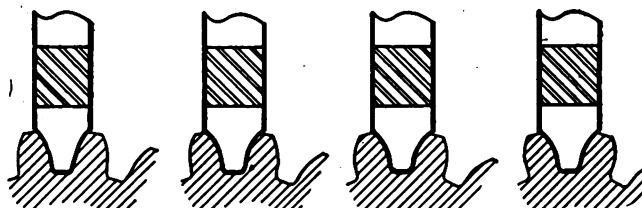
No. 1
To cut from
135 to a rackNo. 2
To cut from
55 to 134 teethNo. 3
To cut from
35 to 54 teethNo. 4
To cut from
26 to 34 teethNo. 5
To cut from
21 to 25 teethNo. 6
To cut from
17 to 20 teethNo. 7
To cut from
14 to 16 teethNo. 8
To cut from
12 to 13 teeth

FIG. 208

NO. 147 CARBON STEEL. NO. 735 HIGH SPEED STEEL
STANDARD HOLE. STANDARD KEYWAY.

Dia- metral Pitch	Diameter of Cutter		Hole Inches	Price Each		Dia- metral Pitch	Diameter of Cutter		Hole Inches	Price Each	
	Carbon Steel	H. Speed Steel		Carbon Steel	H. Speed Steel		Carbon Steel	H. Speed Steel		Carbon Steel	H. Speed Steel
2	5 3/4	5 3/4	1 1/2	\$20.25	\$35.00	14	2	2 1/8	7/8	\$3.40	\$3.75
2 1/2	5 1/2	5 3/4	1 1/2	13.90	23.00	16	2	2 1/8	7/8	3.20	3.50
3	4 7/8	4 3/4	1 1/4	10.10	18.00	18	1 7/8	2	7/8	3.00	3.40
4	3 7/8	4 1/4	1 1/4	7.60	12.00	20	1 7/8	2	7/8	2.90	3.30
5	3 5/8	3 3/4	1 1/4	6.35	10.00	22	1 7/8	2	7/8	2.80	3.20
6	3	3 1/8	1	5.45	8.00	24	1 3/4	1 3/4	7/8	2.65	3.10
7	2 7/8	2 7/8	1	5.15	7.00	26	1 3/4	1 3/4	7/8	2.55	3.00
8	2 7/8	2 7/8	1	5.00	6.00	28	1 3/4	1 3/4	7/8	2.25	3.00
9	2 3/4	2 3/4	1	4.70	5.50	30	1 3/4	1 3/4	7/8	2.25	3.00
10	2 1/4	2 3/8	7/8	4.45	5.00	32	1 3/4	1 3/4	7/8	2.25	3.00
11	2 1/4	2 3/8	7/8	4.20	4.50	36	1 3/4	1 3/4	7/8	2.25	3.00
12	2 1/8	2 1/4	7/8	3.90	4.25	40	1 3/4	1 3/4	7/8	2.25	3.00
						48	1 3/4	1 3/4	7/8	2.25	3.00

Involute Gear Cutters can be sharpened without changing their outline.

Cutters having dimensions other than listed are special and subject to special prices.

SPECIFY ALL TOOLS BY OUR LIST NUMBERS

CUTTERS FOR MITRE AND BEVEL GEARS

Cutters for pitches not given in the list will be made to order.

These Cutters are thin enough to cut any Bevel Gear the tooth face of which is not longer than one-third the distance from its outer end to the point where the shaft center lines meet.

In ordering Cutters for Bevel Gears, if the number of teeth in each gear, the pitch and length of face are given, also the angle of the shafts, if different from a right angle, we can select the proper Cutter to send.

Eight Cutters are made for each pitch and numbered from 1 to 8.

NO. 147M CARBON STEEL STANDARD HOLE

NO. 747 HIGH SPEED STEEL STANDARD KEYWAY

FORMULA FOR SELECTING CUTTERS FOR MITRE AND BEVEL GEARS

Diametral Pitch	Diameter of Cutter		Size of Hole	Price per Cutter	
	Carbon Steel	H. Speed Steel		Carbon Steel	H. Speed Steel
3	4	4	1 1/4	\$9.50	\$15.00
4	3 1/2	3 5/8	1 1/4	7.00	12.00
5	3 1/4	3 3/8	1 1/4	6.00	10.00
6	3	3 1/8	1	5.45	8.00
7	2 7/8	2 7/8	1	5.15	7.00
8	2 7/8	2 7/8	1	5.00	6.00
10	2 1/4	2 3/8	7/8	4.45	5.00
12	2 1/8	2 1/4	7/8	3.90	4.25
14	2	2 1/8	7/8	3.40	3.75
16	2	2 1/8	7/8	3.20	3.50
20	1 7/8	2	7/8	2.90	3.30
24	1 3/4	1 3/4	7/8	2.65	3.10

$$\tan. \alpha = \frac{N_a}{N_b}$$

$$\text{No. of Teeth to select Cutter for Gear} = \frac{N_a}{\cos. \alpha}$$

$$\text{No. of Teeth to select Cutter for Pinion} = \frac{N_b}{\sin. \alpha}$$

N_a = No. of Teeth in Gear

N_b = No. of Teeth in Pinion

α = Center Angle of Gear.

If the gears are mitres or are alike, only one Cutter is needed. if one gear is larger than the other, two may be needed.

ANGULAR CUTTERS

CUTTERS FOR TEETH OF CUTTERS AND MILLS

NO. 138M CARBON STEEL NO. 712 HIGH SPEED STEEL



FIG. 195
LEFT HAND
CUTTER

Angular Cutters will be furnished with included angle of: 45°, 50°, 60°, 70°, and 80°.

Both Right and Left Hand for cutting the teeth of Cutters and Mills. This style of Cutter not adapted for spiral milling.

When ordering Angular Cutters, give the diameter, thickness, size of hole, and also the angles.

Cutters having dimensions other than listed are special and subject to special prices.

Diam. Inches	Thickness Inches	Hole Inches	Price Each	
			Carbon Steel	High Speed Steel
2 1/2	1/2	7/8	\$3.40	\$4.10
2 3/4	1/2	1	3.60	4.45
3	1/2	1 1/4	4.30	5.40

CUTTERS FOR SPIRAL MILLS

NO. 138J CARBON STEEL NO. 717 HIGH SPEED STEEL

Cutters for cutting Spiral Mills are furnished either 40°, 48° or 53° angle on one side, and 12° on the other, both Right and Left Hand. In ordering specify whether Right or Left Hand Cutters are desired.

Diam. Inches	Thickness Inches	Hole Inches	Price Each	
			Carbon Steel	High Speed Steel
2 1/2	1/2	7/8	\$3.40	\$4.10
2 3/4	1/2	1	3.60	4.45
3	1/2	1 1/4	4.30	5.40
3 1/4	1/2	1 1/2	4.80	6.15

Carbon Steel Cutters will be furnished unless High Speed is specified.

*This size furnished only with 53 by 12 degree angle.



FIG. 202

DOUBLE ANGLE CUTTERS

NO. 138N CARBON STEEL NO. 716 HIGH SPEED STEEL

Will be furnished with the included angle either 45°, 60° or 90°.

These Cutters are suitable for cutting reamers, angles and V grooves.

Diam. Inches	Thickness Inches	Hole Inches	Price Each	
			Carbon Steel	High Speed Steel
2 1/2	1/2	7/8	\$3.40	\$4.10
2 3/4	1/2	1	3.60	4.45
3	1/2	1 1/4	4.30	5.40



FIG. 201

SCREW SLOTTING CUTTERS

Screw Slotting Cutters are not ground on the sides.

Cutters having dimensions other than listed are special and subject to special prices.

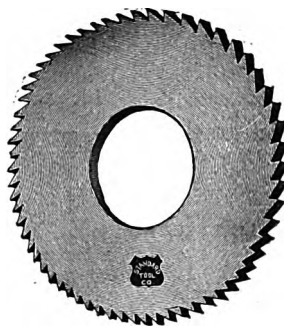


FIG. 205

NO. 139A CARBON STEEL

These Cutters have a fine pitch of teeth especially adapted for the slotting of Screw Heads and similar work

Thickness by American Standard Wire Gauge	Thickness in Decimals of Inch	Diameter Inches	Hole, Inches	Price Each Carbon Steel	Thickness by American Standard Wire Gauge	Thickness in Decimals of Inch	Diameter Inches	Hole, Inches	Price Each Carbon Steel
5	.182	2 3/4	1	\$.90	17	.045	2 1/4	5/8	\$.20
6	.162	2 3/4	1	.75	18	.040	2 1/4	5/8	.20
7	.144	2 3/4	1	.65	19	.035	2 1/4	5/8	.20
8	.128	2 3/4	3/4 and 1	.55	20	.032	2 1/4	5/8	.20
9	.114	2 3/4	3/4 and 1	.50	21	.028	2 1/4	5/8	.20
10	.102	2 3/4	3/4 and 1	.45	22	.025	2 1/4	5/8	.20
11	.091	2 3/4	3/4 and 1	.40	23	.023	2 1/4	5/8	.20
12	.081	2 3/4	3/4 and 1	.35	24	.020	2 1/4	5/8	.20
13	.072	2 3/4	3/4 and 1	.30	25	.018	2 1/4	5/8	.20
14	.064	2 3/4	1 1/2, 5/8, 3/4 and 1	.30	26	.016	2 1/4	5/8	.20
15	.057	2 3/4	1 1/2, 5/8, 3/4 and 1	.20	27	.014	2 1/4	5/8	.20
16	.051	2 3/4	1 1/2, 5/8, 3/4 and 1	.20	28	.012	2 1/4	5/8	.20
17	.045	2 3/4	1 1/2, 5/8, 3/4 and 1	.20	30	.010	2 1/4	5/8	.20
18	.040	2 3/4	1 1/2, 5/8, 3/4 and 1	.20	32	.008	2 1/4	5/8	.20
19	.035	2 3/4	1 1/2, 5/8, 3/4 and 1	.20	34	.006	2 1/4	5/8	.20
20	.032	2 3/4	1 1/2, 5/8, 3/4 and 1	.20	14	.064	1 3/4	5/8	.20
21	.028	2 3/4	1 1/2, 5/8, 3/4 and 1	.20	15	.057	1 3/4	5/8	.20
22	.025	2 3/4	1 1/2, 5/8, 3/4 and 1	.20	16	.051	1 3/4	5/8	.20
23	.023	2 3/4	1 1/2, 5/8, 3/4 and 1	.20	17	.045	1 3/4	5/8	.20
24	.020	2 3/4	1 1/2, 5/8, 3/4 and 1	.20	18	.040	1 3/4	5/8	.20
25	.018	2 3/4	1 1/2, 5/8, 3/4 and 1	.20	19	.035	1 3/4	5/8	.20
26	.016	2 3/4	3/4 and 1	.20	20	.032	1 3/4	5/8	.20
27	.014	2 3/4	3/4 and 1	.20	21	.028	1 3/4	5/8	.20
28	.012	2 3/4	3/4 and 1	.20	22	.025	1 3/4	5/8	.20
30	.010	2 3/4	3/4 and 1	.20	23	.023	1 3/4	5/8	.20
32	.008	2 3/4	3/4 and 1	.20	24	.020	1 3/4	1/2 and 5/8	.15
34	.006	2 3/4	3/4 and 1	.20	25	.018	1 3/4	1/2 and 5/8	.15
10	.102	2 1/4	5/8	.40	26	.016	1 3/4	1/2 and 5/8	.15
11	.091	2 1/4	5/8	.35	27	.014	1 3/4	1/2 and 5/8	.15
12	.081	2 1/4	5/8	.30	28	.012	1 3/4	1/2 and 5/8	.15
13	.072	2 1/4	5/8	.20	30	.010	1 3/4	1/2 and 5/8	.15
14	.064	2 1/4	5/8	.20	32	.008	1 3/4	1/2 and 5/8	.15
15	.057	2 1/4	5/8	.20	34	.006	1 3/4	1/2 and 5/8	.15
16	.051	2 1/4	5/8	.20	..	....	...	...	...

ARBORS FOR SCREW SLOTTING CUTTERS

FIG. 206



NO. 139B

These arbors are for use with screw slotting cutters, and are adapted for use on centers. Made in the following sizes: 3/8, 1/2, 5/8, 3/4, 1, 1 1/2 inch.

Price Each, \$5.00

SPECIFY ALL TOOLS BY OUR LIST NUMBERS

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METAL SLITTING SAWS



FIG. 203

NO. 139C-CARBON STEEL

NO. 724 HIGH SPEED STEEL

Diameter Inches	Thickness Inches	Hole Inches	Price Each	
			Carbon Steel	High Speed Steel
2½	★	⅛	\$ 1.30	\$2.50
2½	★	⅛	1.20	2.40
2½	★	⅛	1.15	2.35
2½	★	⅛	1.15	2.35
2½	⅜	⅛	1.15	2.35
2½	★	⅛	1.40	2.60
3	★	1	1.60	2.95
3	★	1	1.45	2.60
3	★	1	1.30	2.50
3	⅜	1	1.30	2.50
3	★	1	1.30	2.50
3	★	1	1.50	2.85
4	★	1	2.85	4.60

Diameter Inches	Thickness Inches	Hole Inches	Price Each	
			Carbon Steel	High Speed Steel
4	$\frac{3}{16}$	1	\$ 1.85	\$ 3.15
4	$\frac{1}{8}$	1	1.60	2.95
4	$\frac{1}{16}$	1	1.55	2.85
4	$\frac{1}{8}$	1	1.55	2.85
4	$\frac{3}{16}$	1	1.80	3.45
4	$\frac{1}{8}$	1	2.10	3.45
5	$\frac{1}{8}$	1	2.30	3.85
5	$\frac{1}{16}$	1	2.00	3.85
5	$\frac{1}{8}$	1	2.00	3.35
5	$\frac{1}{8}$	$1\frac{1}{4}$	2.00	3.35
5	$\frac{1}{8}$	$1\frac{1}{2}$	2.00	3.35
5	$\frac{3}{16}$	1	2.45	4.30
5	$\frac{1}{8}$	1	2.90	4.30
6	$\frac{1}{8}$	1	5.10	7.50
6	$\frac{3}{16}$	1	3.85	5.85
6	$\frac{1}{8}$	1	3.45	5.35
6	$\frac{1}{8}$	$1\frac{1}{4}$	3.45	5.35
6	$\frac{1}{8}$	1	4.45	6.45
6	$\frac{1}{8}$	$1\frac{1}{2}$	4.45	6.45
7	$\frac{1}{8}$	1	9.50	11.00
7	$\frac{3}{16}$	1	5.70	8.35
7	$\frac{1}{8}$	1	4.85	7.20
7	$\frac{3}{16}$	$1\frac{1}{4}$	6.50	9.05
7	$\frac{1}{8}$	2	6.50	9.05
8	$\frac{1}{8}$	1	7.30	12.00
8	$\frac{1}{8}$	$1\frac{1}{4}$	7.30	12.00
8	$\frac{3}{16}$	$1\frac{1}{4}$	8.90	12.30
8	$\frac{3}{16}$	$1\frac{1}{2}$	8.90	12.30

These are thin Milling Cutters with sides ground slightly concave for clearance. When ordering Special Saws, mention the kind of work for which they are intended.

Carbon Steel Cutters will be furnished unless High Speed is specified.

HOLLOW MILLS

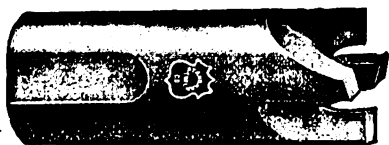


FIG. 3833

NO. 138H—CARBON STEEL

NO. 771—HIGH SPEED STEEL

Carbon Steel Mills will be furnished unless High Speed is specified.

These Mills are often used on short cuts, immediately preceding threading dies, but on long, straight cuts, and especially on square stock, and in cutting large-headed screws from a bar, they should be followed by a box tool.

Specify whether Mills are wanted for cutting brass or steel.

Size Hole Inches	Outside Diameter Inches	Length Over All Inches	Price Each	
			Carbon Steel	High Speed Steel
$\frac{3}{32}$	$\frac{5}{8}$	$1\frac{1}{2}$	\$1.35	\$2.75
$\frac{1}{8}$	$\frac{5}{8}$	$1\frac{1}{2}$	1.35	2.75
$\frac{3}{32}$	$\frac{5}{8}$	$1\frac{1}{2}$	1.35	2.75
$\frac{1}{4}$	$\frac{5}{8}$	$1\frac{1}{2}$	1.35	2.75
$\frac{7}{32}$	$\frac{5}{8}$	$1\frac{1}{2}$	1.35	2.75
$\frac{1}{4}$	$\frac{5}{8}$	$1\frac{1}{2}$	1.35	2.75
$\frac{9}{32}$	$\frac{3}{4}$	2	2.00	3.00
$\frac{5}{16}$	$\frac{3}{4}$	2	2.00	3.00
$\frac{11}{32}$	$\frac{3}{4}$	2	2.00	3.00
$\frac{3}{8}$	1	2	2.70	3.25
$\frac{7}{16}$	1	2	2.70	3.25
$\frac{1}{2}$	1	2	2.70	3.25
$\frac{9}{16}$	$1\frac{1}{4}$	$2\frac{1}{4}$	3.00	4.25
$\frac{5}{8}$	$1\frac{1}{4}$	$2\frac{1}{4}$	3.00	4.25
$\frac{11}{16}$	$1\frac{1}{2}$	$2\frac{1}{2}$	3.35	5.25
$\frac{3}{4}$	$1\frac{1}{2}$	$2\frac{1}{2}$	3.35	5.25
$\frac{7}{8}$	$1\frac{1}{2}$	$2\frac{1}{2}$	3.35	5.25
$\frac{15}{16}$	$1\frac{3}{4}$	$2\frac{3}{4}$	4.00	6.50
1	$1\frac{3}{4}$	$2\frac{3}{4}$	4.00	6.50
	$1\frac{3}{4}$	$2\frac{3}{4}$	4.00	6.50

SPECIFY ALL OUR TOOLS BY OUR LIST NUMBERS

SHELL END MILLS

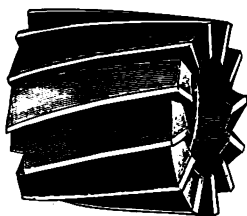


FIG. 211

NO. 138E—CARBON STEEL
NO. 769—HIGH SPEED STEEL

Shell End Mills are regularly furnished either right or left hand and with spiral teeth.

Shell End Mills with straight teeth or those having dimensions other than listed are special and subject to special prices.

Diam. Inches	Length of Cut Inches	Hole Inches	Price Each	
			Carbon Steel	High Speed Steel
1 1/4	1 1/4	3/4	\$5.30	\$6.60
1 1/8	1 1/4	3/4	5.30	6.70
1 1/4	1 1/4	3/4	5.45	6.85
2	1 1/4	3/4	5.45	7.05
2 1/8	1 1/4	3/4	5.60	7.25
2 1/4	2 1/4	1	6.20	8.55
2 3/8	2 1/4	1	6.35	8.85
2 1/2	2 1/4	1	6.50	9.15
2 5/8	2 1/4	1	6.80	9.75
2 3/4	2 1/4	1	7.15	10.40
2 7/8	2 1/4	1	7.55	11.00
3	2 1/4	1	8.00	11.75

In ordering, state whether Right or Left Hand Mills are wanted.

ARBORS FOR SHELL END MILLS

WITH MORSE TAPER SHANKS

NO. 138 G

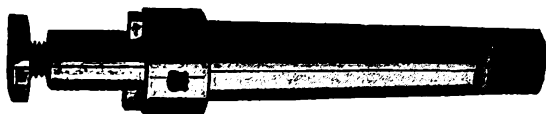


FIG. 3834

Number	Price Each	Fitting Sizes, Inches	Morse Taper Shank, Number
1	\$5.00	1 1/4 to 1 1/2	3
2	6.00	1 3/8 to 2 3/8	4
3	6.00	2 1/4 to 3	4

State whether Arbors are desired for Right or Left Hand Mills.

COARSE TOOTH SHELL END MILLS

NO. 825

Coarse Tooth Shell End Mills are regularly furnished of high speed steel either right or left hand and with spiral teeth.

Coarse Tooth Shell End Mills with straight teeth or having dimensions other than listed are special and subject to special prices.

Carbon Steel Coarse Tooth Shell End Mills are special.

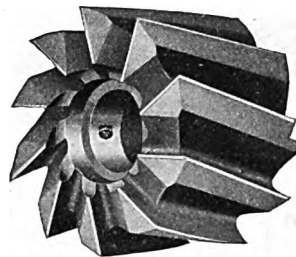


FIG. 3835

COARSE TOOTH SPIRAL CUT END MILLS

WITH BROWN & SHARPE TAPER SHANK

NO. 810

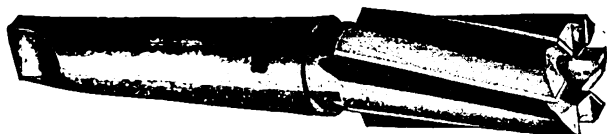


FIG. 3836

These End Mills are regularly made of high speed steel and are especially adapted for use on modern heavy duty milling machines. Carbon Steel Mills are special.

In ordering always specify whether right or left hand Mills are wanted.

SPECIFY ALL TOOLS BY OUR LIST NUMBERS

SPIRAL END MILLS

WITH BROWN & SHARPE TAPER SHANKS

WITH MORSE TAPER SHANKS



FIG. 210—LEFT HAND MILL

NO. 138—CARBON STEEL

NO. 762—HIGH SPEED STEEL

Diam. Inches	Taper No.	Length Cut Inches	Length Over All Inches	Price Each	
				Carbon Steel	H. Speed Steel
1/4	4	1 1/8	2 1/8	\$1.25	\$1.40
1/4	5	1 1/8	3	1.45	1.70
1/4	4	1 1/8	2 1/2	1.25	1.40
1/4	5	1 1/8	3 1/8	1.45	1.70
3/8	4	1 1/8	2 1/2	1.40	1.55
3/8	5	1 1/8	3 1/8	1.55	1.75
3/8	4	1 1/8	2 1/8	1.40	1.55
3/8	5	1 1/8	3 1/8	1.60	1.80
1/2	5	1 1/8	3 1/8	1.65	1.90
1/2	7	1 1/8	5 1/8	1.80	2.40
1/2	5	1 1/8	3 1/4	1.70	2.00
1/2	7	1 1/8	5 1/4	2.00	2.50
5/8	5	1 1/8	3 1/8	1.80	2.20
5/8	7	1 1/8	5 1/2	2.15	2.80
5/8	7	1 1/8	5 1/2	2.20	2.85
5/8	9	1 1/8	6 3/4	2.40	3.75
3/4	7	1 1/8	5 5/8	2.25	2.95
3/4	9	1 1/8	6 7/8	2.50	3.85
3/4	7	1 3/4	5 3/4	2.65	3.55
3/4	9	1 3/4	7	2.85	4.25
1	7	1 1/8	5 7/8	2.70	3.80
1	9	1 1/8	7 1/8	2.90	4.35
1 1/8	7	2	6	2.85	4.20
1 1/8	9	2	7 1/4	3.00	4.60
1 1/4	7	2	6	2.85	4.45
1 1/4	9	2	7 1/4	3.25	5.10
1 3/8	9	2 1/8	7 7/8	3.45	6.25
1 1/2	9	2 1/4	7 1/2	3.80	6.85

These End Mills are regularly furnished either right or left hand.



FIG. 212

NO. 138 1/2—CARBON STEEL

NO. 763—HIGH SPEED STEEL

Diameter Inches	Taper No.	Length Cut Inches	Length Over All Inches	Price Each	
				Carbon Steel	H. Speed Steel
1/4	1	1 1/8	3 5/8	\$1.45	\$1.70
1/4	1	1 1/8	3 1/4	1.45	1.70
3/8	1	1 1/8	3 1/4	1.55	1.75
3/8	1	1 1/8	3 3/4	1.60	1.85
1/2	2	1	4 1/2	1.75	2.25
1/2	1	1	3 1/4	1.65	1.90
1/2	2	1 1/8	4 5/8	1.80	2.30
1/2	1	1 1/8	3 1/8	1.70	2.00
5/8	2	1 1/4	4 3/4	2.00	2.40
5/8	2	1 1/2	5	2.00	2.50
5/8	2	1 1/2	5	2.20	2.75
3/4	2	1 5/8	5 1/8	2.25	2.85
3/4	3	1 5/8	5 1/8	2.50	3.45
3/4	2	1 3/4	5 1/4	2.65	3.40
7/8	3	1 3/4	6 1/4	2.85	3.75
1	2	1 7/8	5 5/8	2.70	3.60
1	3	1 7/8	6 1/8	2.90	4.00
1 1/8	3	2	6 5/8	3.00	4.25
1 1/4	3	2	6 1/8	3.10	4.65
1 1/4	4	2	7 5/8	3.25	5.00
1 3/8	3	2 1/8	6 1/4	3.35	5.20
1 3/8	4	2 1/8	7 1/2	3.45	5.60
1 1/2	3	2 1/4	6 5/8	3.45	5.65
1 1/2	4	2 1/4	7 5/8	3.80	6.25

Standard and Morse Tapers are the same.

These End Mills are furnished regularly in right hand.
Left Hand End Mills are special.

STRAIGHT FLUTED END MILLS

WITH BROWN & SHARPE TAPER SHANKS



RIGHT HAND MILL—FIG. 209

NO. 138A CARBON STEEL

NO. 760 HIGH SPEED STEEL

Diam. Inches	Taper No.	Length Cut Inches	Length Over All, Inches	Price Each	
				Carbon Steel	H. Speed Steel
1/4	4	1 1/8	2 1/8	\$1.25	\$1.40
1/4	5	1 1/8	3	1.45	1.70
1/4	4	1 1/8	2 1/2	1.25	1.40
1/4	5	1 1/8	3 1/8	1.45	1.70
3/8	4	1 1/8	2 1/2	1.40	1.55
3/8	5	1 1/8	3 1/8	1.55	1.75
3/8	4	1 1/8	2 1/8	1.40	1.55
3/8	5	1 1/8	3 1/8	1.60	1.80
1/2	5	1	3 1/8	1.65	1.90
1/2	7	1 1/8	5 1/8	1.80	2.40
1/2	5	1 1/8	3 1/4	1.70	2.00

These End Mills are furnished regularly in right hand.

Carbon Steel Mills will be furnished unless High Speed is specified.

SPECIFY ALL TOOLS BY OUR LIST NUMBERS

ARBORS AND COLLETS FOR MILLING MACHINES

STYLE A CUTTER ARBOR



FIG. 3837

FLY CUTTER ARBOR



FIG. 3838

We can furnish arbors and collets for any make or size of Milling machine. When writing for information be sure to send us full particulars regarding the make and style of machines for which the arbors or collets are wanted. Also full information regarding dimensions.

We strongly recommend the use of arbors of the largest diameter that the work and cutters will permit.

SHELL END MILL ARBOR



FIG. 3841

SOLID COLLET

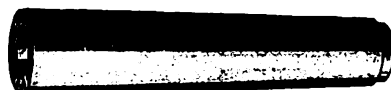


FIG. 3839

SPLIT COLLET

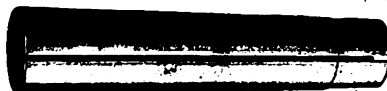


FIG. 3840

SPACERS FOR MILLING MACHINE ARBORS

These Spacers replace the old method of searching the scrap pile for a piece of metal of the right thickness to whittle out a makeshift with snips, hammer and chisel. The new way is to purchase an assortment of these spacers to be kept in a convenient place for immediate use. They are attractive enough to make anyone feel like putting them away so that they can be used over and over again.

They are furnished in thicknesses from .001 inch to 3 inches, and all thicknesses with the exception of .001 are made of a good grade of durable open hearth cold rolled strip steel. Spacers .001 inch thick are made of brass. Can be furnished with or without identification marks.

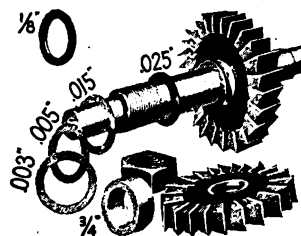


FIG. 3842

W & B LATHE ATTACHMENT FOR MILLING

This attachment is designed to handle a very large range of milling that does not require a milling machine proper. A degree of accuracy equal to that of any machine tool can be obtained, as there is a micrometer on the elevating screw and graduated in the angle of degrees for angular work where it is necessary to swivel the vise.

This tool is not confined to automobile shops, but is indispensable in any shop that is busy. Being provided with dividing device, it can be used for the most common milling operations; such as squaring auto driveshafts, cutting woodruff key seats, making valve reseating tools, fluting taps and reamers, slotting screws, cutting all kinds of closed-end and plain key ways.

The above operations can be done with the W. & B. vise in a fraction of the time required to set up a regular milling machine. This attachment would be a paying investment in any shop, though it be equipped with a milling machine.

The jaws of this attachment are equipped with steel plates, one plate grooved, elevating screw $\frac{5}{8}$ inch; 8 pitch square thread, adjustable micrometer, jaws screw $\frac{5}{8}$ inch; 8 pitch square thread, indexing collar $\frac{1}{2}$ divisions.

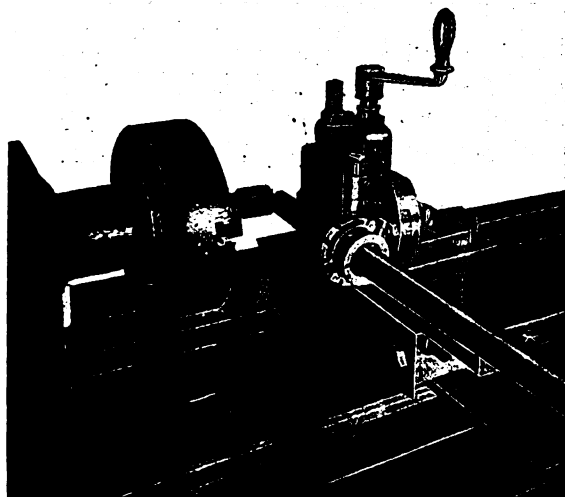


FIG. 3843

Jaws open, inches.....	2
Range of vertical movement, inches.....	4
Swivels, degrees.....	25
Weight, lbs.....	37
Price.....	

THE PASCHALL LATHE ATTACHMENT

MODEL "G"

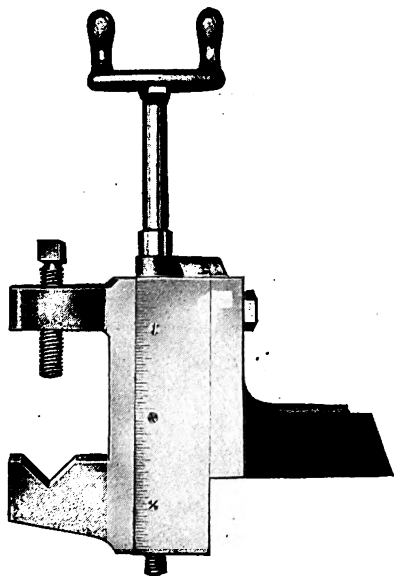


FIG. 189

Vise will hold.....	2½"
Width of Jaws.....	4"
Net weight about.....	17½ lbs
Height of Attachment (not including Elevation Screw).....	6"
Length of Attachment (including Elevation Screw).....	12"
Price.....	

This attachment fills a long felt want in garage and machine shops where there is more or less milling work of a light character, such as axle squaring, key cutting, slotting and grooving to be done.

The Paschall Attachment is universal, inasmuch as it may be attached to any lathe carrying a compound rest. It is a simple tool post attachment.

The time required for setting up is but a matter of a moment, inasmuch as it is unnecessary to remove any portion of the lathe.

The Paschall Attachment permits the use of all automatic feeds of the lathe, the only hand operation being the perpendicular or elevation feed.

This Attachment has both a taper and a depth gauge.

Cutters of any type may be used in connection with the Paschall Attachment and in practically the same manner as used with a milling machine, viz: Cutters may be carried in a chuck, in a collet or on an arbor between centers. This fact, with the construction of the tool which enables one to cut tapered keyways or slots, virtually makes a milling machine for simple work of any lathe to which it is attached.

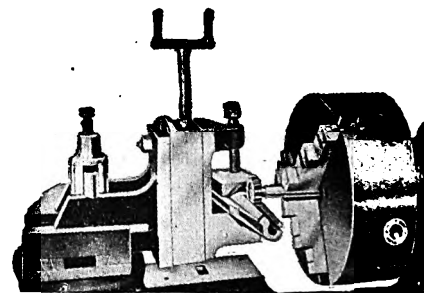


FIG. 191

NEFF MACHINISTS' INDEX

This is an ideal device for laying off squares, hexagons, octagons, etc., lining up or off-setting keyways, lining up or off-setting drill press work, and innumerable other operations apparent to any machinist.

It is particularly a first-class Index Head for use with Milling Attachments for Lathes, such as the Paschall Lathe Attachment.

This combination greatly increases lathe operations and output. Lathe operators are continually bringing to our attention new and complicated work they have accomplished by the use of the Paschall Attachment and Neff Index.

No. 1—For material up to 2½" diam.

Price,.....

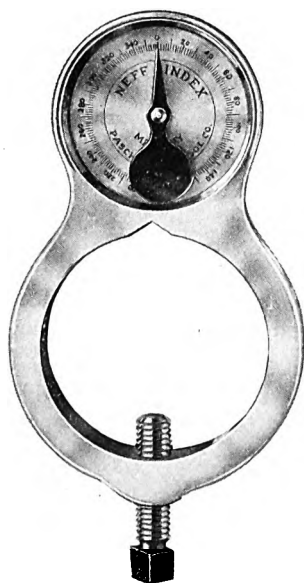


FIG. 3844

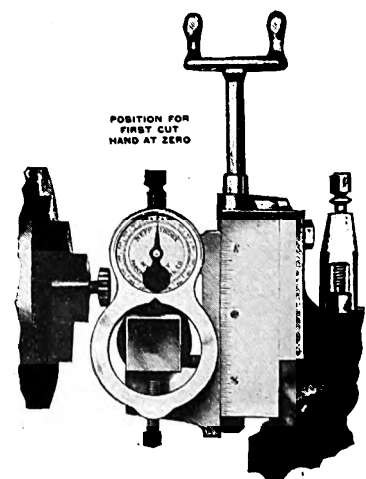


FIG. 3845

M & C SMALL, PLAIN, MILLING MACHINES

ARE FURNISHED EITHER TO BE USED ON BENCH OR WITH BASE TO FLOOR
THESE ARE VERY STIFF, RUGGED MACHINES, BEING ABOUT ONE-HALF HEAVIER THAN OTHER MACHINES
OF THEIR SIZE AND PRICE

These machines have bearings of large proportions and are provided with ample and easy adjustment for wear.

The spindle bearings are kept lubricated with a felt wick that extends the entire length of the box and down into the oil wells, making it practically self-oiling.

The elevating and saddle screws are graduated in .001 of an

inch, and are provided with pointers.

These machines are carefully built of the best of material and are tested and guaranteed accurate to within two one-thousandths of an inch to the foot, and are furnished with 2 Drop Forged Wrenches, other equipment not regularly furnished.

The Nos. 2 and 3 Millers are similar except that the No. 3 is a larger machine and is provided with overhanging arm and arbor support, crank elevation, movable graduating dials and can be equipped with vertical attachment. The No. 3 Millers are machined for power feed which can be purchased at any time while the No. 2 Machines are furnished for hand feed only. Both machines can be supplied for use on bench or with base to floor. The bases are interchangeable as both the Nos. 2 and 3 machines are drilled on both machine and base.

Machines equipped with power feed are provided with quarter section steel rack engaged with worm gear, the curved teeth of the rack making a smooth running table.

The No. 3 can be furnished with Vertical Attachment.

Plain Index Centers can be supplied for either the No. 2 or No. 3 machine.

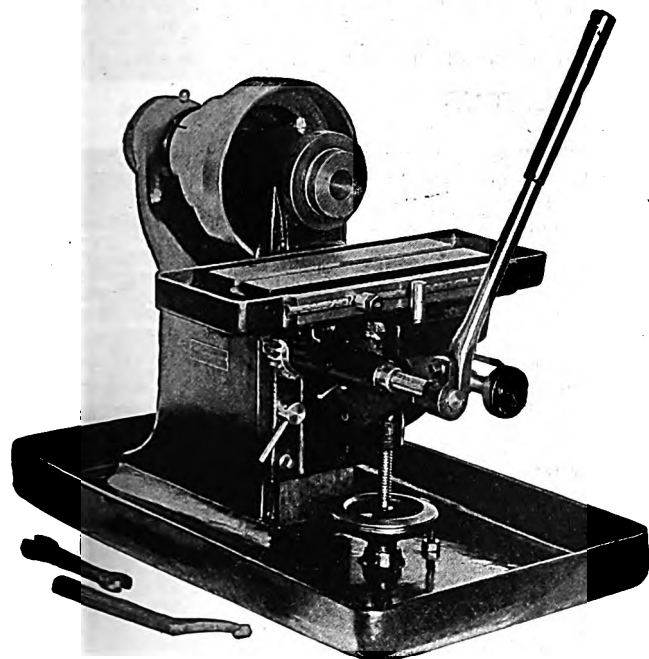


FIG. 188
NO. 2 LEVER HAND FEED MILLER
NOT FURNISHED WITH POWER FEED

SPECIFICATIONS

Machine	No. 2	No. 3
Feed of table.....Inches	9	14½
Cross feed of saddle.....Inches	3¼	3¼
Vertical range of knee.....Inches	6¾	6¾
Full size of table.....Inches	6½ x 17	6½ x 22
Size of table inside oil channel.....Inches	4 x 12	4 x 17
Width of T slot in table.....Inch	⅝	⅝
Greatest distance from table to center of spindle.....Inches	6¾	6¾
Largest diameter of cone.....Inches	8	8
Smallest diameter of cone.....Inches	3¾	3¾
Driving belt.....Inches	2	2
Front spindle bearing bronze. Inches	2 x 4	2¼ x 3½ Tapered
Taper hole in spindle.....B. and S.	No. 10	No. 10
Hole through spindle.....Inch	¾	¾
Height over all.....Inches	21½	25½
Size of pan.....Inches	16 x 26½	16 x 26½
Loose pulley on countershaft. Inches	8 x 2¼	8 x 2¼
Weight of machine, complete...Lbs.	340	441
Domestic shipment, crated...Lbs.	390	491
Weight of machine base.....Lbs.	200	200

Prices upon application.

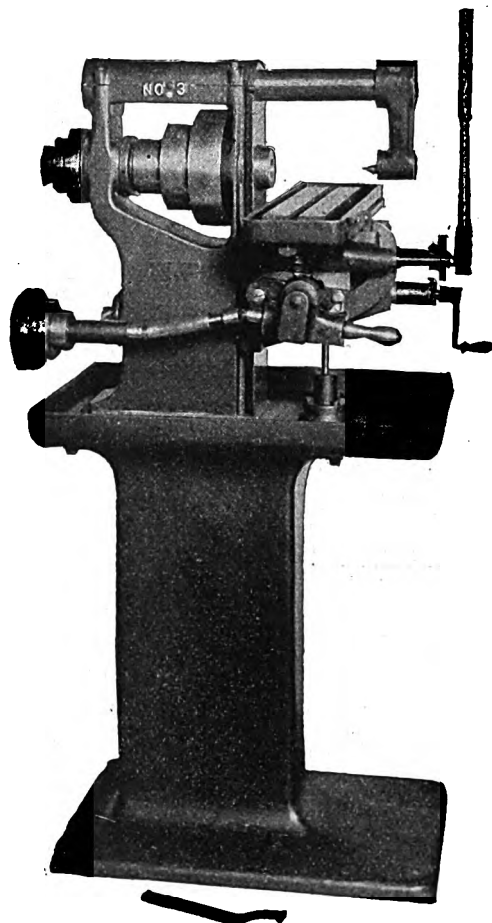


FIG. 186
NO. 3 POWER FEED MILLER ON BASE

FOR MILLING MACHINES OF LARGER CAPACITIES SEE PAGE 807

G. T. D. ROUND DIE SCREW PLATES

Round Adjustable $\frac{1}{8}$ inch diameter Split Dies and Plug Taps.

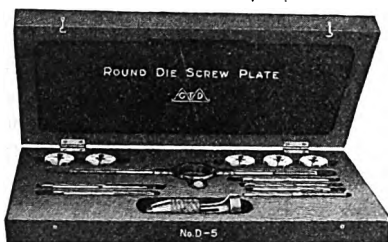


FIG. 218

No.	Cutting Sizes	Length Stock, in.	Weight Pounds	Price
D 8	Machine Screw 8 Sizes 4^{10} , 6^{10} , 8^{10} , 10^{10} , 10^{11} , 12^{10} , 14^{10} , 16^{10}	$6\frac{1}{4}$	$1\frac{3}{4}$	\$12.00
DD 6	Fractional 6 Sizes $\frac{1}{8}^{10}$, $\frac{5}{16}^{10}$, $\frac{3}{8}^{10}$, $\frac{7}{16}^{10}$, $\frac{1}{2}^{10}$, $\frac{9}{16}^{10}$	$6\frac{1}{4}$	$1\frac{3}{4}$	8.25
DD 7	Fractional 7 Sizes $\frac{1}{4}^{10}$, $\frac{1}{8}^{10}$, $\frac{3}{16}^{10}$, $\frac{5}{16}^{10}$, $\frac{3}{8}^{10}$, $\frac{7}{16}^{10}$, $\frac{1}{2}^{10}$	$6\frac{1}{4}$	$1\frac{3}{4}$	9.25
DD 8	Fractional 8 Sizes $\frac{1}{4}^{10}$, $\frac{3}{8}^{10}$, $\frac{1}{2}^{10}$, $\frac{5}{8}^{10}$, $\frac{3}{4}^{10}$, $\frac{7}{8}^{10}$, 1^{10} , $1\frac{1}{8}^{10}$	$6\frac{1}{4}$	$1\frac{3}{4}$	10.50

United States Standard form of thread furnished unless otherwise specified.

O. K. SCREW PLATES

O. K. Screw Plates though low in price are high in quality and have features not found in others. The stock is made with an adjustable guide which starts the die onto the rod straight. This guide is adjustable to any size rod. The dies are adjustable. O. K. Dies are forged. The metal is therefore keen cutting and durable. Spaces are forged back of the cutting teeth where chips collect. This prevents clogging.

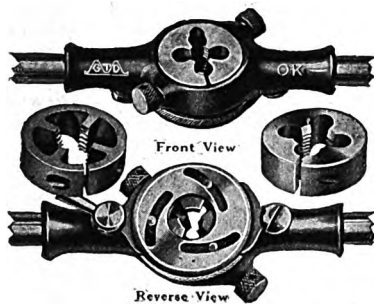


FIG. 3846

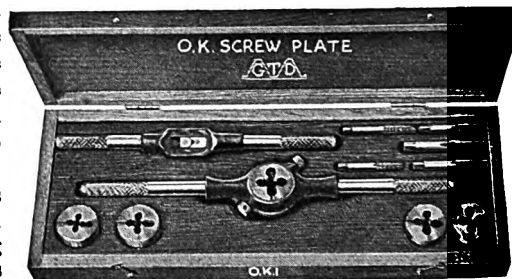


FIG. 3847

O. K. SINGLE STOCK SCREW PLATES ASSORTMENTS AND PRICES

No.	Cutting Sizes	Taps	Dies O. D.	Length Stock, in.	Length Adj. Tap Wrench, inches	Weight Pounds	Price
OK 1	5 Sizes $\frac{1}{4}^{10}$, $\frac{5}{16}^{10}$, $\frac{3}{8}^{10}$, $\frac{7}{16}^{10}$, $\frac{1}{2}^{10}$	Plug	$1\frac{1}{2}$	14	$10\frac{1}{2}$	$6\frac{1}{2}$	\$13.50
OK 5	7 Sizes $\frac{1}{4}^{10}$, $\frac{5}{16}^{10}$, $\frac{3}{8}^{10}$, $\frac{7}{16}^{10}$, $\frac{1}{2}^{10}$, $\frac{5}{8}^{11}$, $\frac{3}{4}^{10}$	Plug	2	23	15	12	21.00
OK 10	9 Sizes $\frac{1}{4}^{10}$, $\frac{5}{16}^{10}$, $\frac{3}{8}^{10}$, $\frac{7}{16}^{10}$, $\frac{1}{2}^{10}$, $\frac{5}{8}^{11}$, $\frac{3}{4}^{10}$, $\frac{7}{8}^{10}$, 1^{10}	Plug	2	26	(2) 8 & 20	22	31.00

U. S. S. Threads furnished unless otherwise ordered. S. A. E. and Whitworth Standards furnished at regular prices if specified.

O. K. COMBINATION SCREW PLATES WITH U. S. AND S. A. E. STANDARD THREADS

No.	Cutting Sizes	Taps	Dies O. D.	Length Stock, in.	Length Adj. Tap Wrench, inches	Weight Pounds	Price
OK 531	7 Sizes U. S. Standard $\frac{1}{4}^{10}$, $\frac{5}{16}^{10}$, $\frac{3}{8}^{10}$, $\frac{7}{16}^{10}$, $\frac{1}{2}^{10}$, $\frac{5}{8}^{11}$, $\frac{3}{4}^{10}$ and 7 Sizes S. A. E. Standard $\frac{1}{4}^{10}$, $\frac{5}{16}^{10}$, $\frac{3}{8}^{10}$, $\frac{7}{16}^{10}$, $\frac{1}{2}^{10}$, $\frac{5}{8}^{11}$, $\frac{3}{4}^{10}$	Plug	2	23	15	$17\frac{1}{2}$	\$34.50
OK 1032	9 Sizes U. S. Standard $\frac{1}{4}^{10}$, $\frac{5}{16}^{10}$, $\frac{3}{8}^{10}$, $\frac{7}{16}^{10}$, $\frac{1}{2}^{10}$, $\frac{5}{8}^{11}$, $\frac{3}{4}^{10}$, $\frac{7}{8}^{10}$, 1^{10} and 9 Sizes S. A. E. Standard $\frac{1}{4}^{10}$, $\frac{5}{16}^{10}$, $\frac{3}{8}^{10}$, $\frac{7}{16}^{10}$, $\frac{1}{2}^{10}$, $\frac{5}{8}^{11}$, $\frac{3}{4}^{10}$, $\frac{7}{8}^{10}$, 1^{10}	Plug	2	26	(2) 8 & 20	$23\frac{1}{2}$	52.00

Little Giant SCREW PLATES

The die proper is in two pieces (Fig. II); each half having two cutting edges. The die can be easily and quickly removed from the cap and the cutting edges sharpened on a thin emery wheel.

The die is held in a cap (Fig. I). The edges of the die are bevelled to the same angle as the bevelled edges of the slot in the cap. A small screw at each end of the slot enables the workman to adjust the halves to the exact size.

The die is bevelled on both sides to permit reversing the die so that work may be threaded either through the guide or from the face, determined by the character of the work.

After the die is laid in the slot in the cap, a screw-guide (Fig. III) wedges it tight. The die is thus held in a three-angle grip, the surest grip known to the science of mechanics. It cannot tilt out of alignment.

When the screw-guide is tightened, the whole (die, cap and screw-guide) becomes practically a solid die, possessing all the rigidity of a solid piece of metal. Yet it is easily taken apart, the die sharpened, and re-assembled.

Prices of Little Giant Dies on page 77.

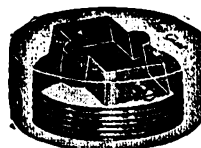


FIG. 1, CAP



FIG. 2, DIE



FIG. 3, GUIDE

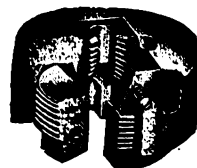


FIG. 4, DIE AND COLLET

Little Giant SINGLE STOCK SCREW PLATES

EQUIPPED WITH LITTLE GIANT DIES DESCRIBED ON PAGE 74

No.	Cutting Sizes	Taps	Collet Dia. in.	Length Stock in.	Adj. Tap Wrench		Weight Pounds	Price
					No.	Length in.		
A 1½	7 Sizes 1/4", 5/16", 3/8", 7/16", 1/2", 5/8", 3/4"	Plug	1 1/4	7 1/2	0	7 1/2	2 1/2	\$14.50
A 2 1/2	10 Sizes 1/4", 5/16", 3/8", 7/16", 1/2", 5/8", 3/4", 7/8", 1", 1 1/8"	Plug	1 1/4	7 1/2	0	7 1/2	4	19.50
AA 4	7 Sizes 1/4", 5/16", 3/8", 7/16", 1/2", 5/8", 3/4"	Plug	1 1/4	7 1/2	0	7 1/2	3	14.50
*1	5 Sizes 1/4", 5/16", 3/8", 7/16", 1/2"	Plug	2	14 1/2	5	11 1/2	9	18.50
5 1/2	8 Sizes 1/4", 5/16", 3/8", 7/16", 1/2", 5/8", 3/4", 7/8"	Plug	2 3/4	23	6	15	22	30.75
7	9 Sizes 1/4", 5/16", 3/8", 7/16", 1/2", 5/8", 3/4", 7/8", 1"	Plug	2 3/4	26	5	11 1/2	27	42.00
20	6 Sizes 1/4", 5/16", 3/8", 7/16", 1/2", 5/8"	Plug	4	40	7	31	49 1/2	53.50

United States Standard threads furnished unless otherwise ordered.
S. A. E. and Whitworth Standard threads furnished at above prices if specified.
*Has Bit Brace Shank in addition to Stock and Tap Wrench.

FIG. 3849

Little Giant TWO STOCK SCREW PLATES

No.	Cutting Sizes	Taps	Collet Dia. inches		Length Stock inches	Adj. Tap Wrench		Wgt. Lbs.	Price
			7/16 & smaller	1/2 & larger		No.	Length		
8	7 Sizes 1/4", 5/16", 3/8", 7/16", 1/2", 5/8", 3/4"	Plug	2	2 3/4	(2) 14 1/2 & 26	6	15	19 1/2	\$30.00
9	9 Sizes 1/4", 5/16", 3/8", 7/16", 1/2", 5/8", 3/4", 7/8", 1"	Plug	2	2 3/4	(2) 14 1/2 & 29	5	11 1/2	26	43.50
						7	19 1/2		

These sets are equipped with Bit Brace Shank fitting 2-inch diameter collets, in addition to the Stocks and Wrenches.

United States Standard threads furnished unless otherwise ordered.
S. A. E. and Whitworth Standard threads furnished at above prices if specified.



FIG. 3850

Little Giant FULL MOUNTED SCREW PLATES

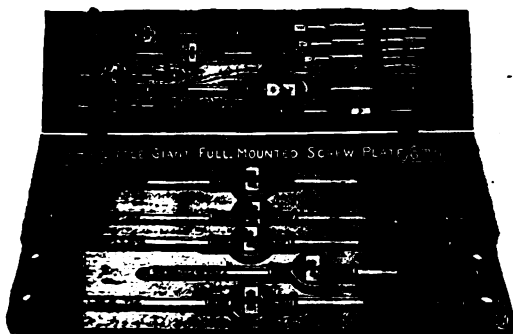


FIG. 3851

THESE SETS HAVE A SEPARATE STOCK FOR EACH DIE

No.	Cutting Sizes	Taps	Adj. Tap Wrench		Weight Pounds	Price
			No.	Length in.		
65	7 Sizes 1/4", 5/16", 3/8", 7/16", 1/2", 5/8", 3/4"	Plug	6	15	24	\$34.50
67	9 Sizes 1/4", 5/16", 3/8", 7/16", 1/2", 5/8", 3/4", 7/8", 1"	Plug	5	11 1/2	37 1/2	54.00
			7	19 1/2		

United States Standard threads furnished unless otherwise ordered.

S. A. E. and Whitworth Standard threads furnished at above prices if specified.

Little Giant COMBINATION SCREW PLATES

BOTH U. S. STANDARD AND S. A. E. STANDARD THREADS

No.	Cutting Sizes	Taps		Collet Dia. inches		Length Stock inches	Adj. Tap Wrench		Wgt. Lbs.	Price
		U.S.S.	S.A.E.	1/2 & smaller	1/2 & larger		No.	Length in.		
310	5 Sizes U. S. Std. 1/4", 5/16", 3/8", 7/16", 1/2" and S. A. E. Std. 1/4", 5/16", 3/8", 7/16", 1/2"	Plug	Plug	2	2 3/4	14 1/2	5	11 1/2	14	\$29.25
311	8 Sizes U. S. Std. 1/4", 5/16", 3/8", 7/16", 1/2", 5/8", 3/4" and S. A. E. Std. 1/4", 5/16", 3/8", 7/16", 1/2", 5/8", 3/4"	Plug	Plug	2	2 3/4	(2) 14 1/2 & 23	5	11 1/2	31	56.00
312	10 Sizes U. S. Std. 1/4", 5/16", 3/8", 7/16", 1/2", 5/8", 3/4", 7/8", 1" and S. A. E. Std. 1/4", 5/16", 3/8", 7/16", 1/2", 5/8", 3/4", 7/8", 1"	Plug	Plug	2	2 3/4	(2) 14 1/2 & 29	5	11 1/2	33	79.00
							7	19 1/2		

These combination assortments avoid the expense of buying a separate outfit for each thread standard and the consequent duplication of Stocks and Tap Wrenches.

A Bit Brace Shank Fitting 2-inch diameter Collet is also provided in these assortments for convenience where it is desired to merely run over a slightly battered thread without removing the bolt or screw from its place in the car.



FIG. 3852

Little Giant AUTOMOBILE SCREW PLATES

WITH S. A. E. STANDARD THREADS



FIG. 3853

No.	Cutting Sizes	Taps	Collet Dia. in.	Length Stock inches	Adj. Tap Wrench		Wgt. Lbs.	Price
					No.	Length in.		
*305	5 Sizes $\frac{1}{4}^{20}$, $\frac{5}{16}^{18}$, $\frac{3}{8}^{16}$, $\frac{7}{16}^{14}$, $\frac{1}{2}^{12}$	Plug	2	14½	5	11½	8	\$18.50
306	6 Sizes $\frac{1}{4}^{20}$, $\frac{5}{16}^{18}$, $\frac{3}{8}^{16}$, $\frac{7}{16}^{14}$, $\frac{1}{2}^{12}$, $\frac{5}{8}^{11}$	Plug	2¾	26	7	19½	21½	32.75
307	11 Sizes $\frac{1}{4}^{20}$, $\frac{5}{16}^{18}$, $\frac{3}{8}^{16}$, $\frac{7}{16}^{14}$, $\frac{1}{2}^{12}$, $\frac{5}{8}^{11}$, $\frac{3}{4}^{10}$, $\frac{1}{2}^{12}$, $\frac{5}{8}^{11}$, $\frac{3}{4}^{10}$, $\frac{1}{2}^{12}$	Plug	2¾	26	{ 5 7	{ 11½ 19½	30	48.25

All taps and dies in above sets have S. A. E. Standard Threads unless otherwise ordered. U. S. Standard and Whitworth Standard Threads furnished at regular prices if specified.

*Has Bit Brace Shank in addition to stock and tap wrench.

**OPENING DIE SCREW PLATES**

FIG. 3857



FIG. 3854

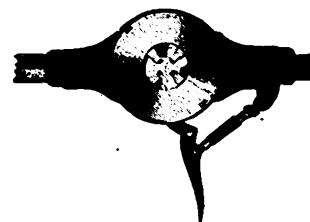


FIG. 3855



FIG. 3856

This is the newest die stock on the market. When the thread is finished instead of turning the stock back over the rod or thread just cut, simply throw the lever which opens the die and pull the stock straight off the rod. This feature is a convenience and a time saver. All parts are made of steel. The dies are sharp and durable. The dies can be adjusted from normal to thread rods that are slightly under or oversize. One set of four chasers furnished for each cutting size. Furnished for cutting either U. S. Std. or S. A. E. threads. Combination assortments also furnished as listed below.

No.	Cutting Sizes	Taps	Adj. Tap Wrench		Weight Pounds	Price Complete	Extra Stocks Each	Extra Chasers Per Set
			No.	Length in.				
601	5 Sizes $\frac{1}{4}^{20}$, $\frac{5}{16}^{18}$, $\frac{3}{8}^{16}$, $\frac{7}{16}^{14}$, $\frac{1}{2}^{12}$	Plug	5	11	9½	\$25.00	\$10.00	\$2.00
605	7 Sizes $\frac{1}{4}^{20}$, $\frac{5}{16}^{18}$, $\frac{3}{8}^{16}$, $\frac{7}{16}^{14}$, $\frac{1}{2}^{12}$, $\frac{5}{8}^{11}$, $\frac{3}{4}^{10}$	Plug	6	15	10½	35.00	10.00	2.00
605½	8 Sizes $\frac{1}{4}^{20}$, $\frac{5}{16}^{18}$, $\frac{3}{8}^{16}$, $\frac{7}{16}^{14}$, $\frac{1}{2}^{12}$, $\frac{5}{8}^{11}$, $\frac{3}{4}^{10}$, $\frac{1}{2}^{12}$	Plug	6	15	11½	38.00	10.00	2.00

**COMBINATION OPENING DIE SCREW PLATES**

Each of the assortments listed contains one G. T. D. Opening Die stock with chasers in the sizes named, U. S. S. or S. A. E. Standard Plug Taps, one Adjustable Tap Wrench (except two Tap Wrenches for No. 611 Set).

No.	Cutting Sizes	Taps	Adj. Tap Wrench		Weight Pounds	Price Complete	Extra Stocks Each	Extra Chasers Per Set
			No.	Length in.				
610	5 Sizes U. S. Standard $\frac{1}{4}^{20}$, $\frac{5}{16}^{18}$, $\frac{3}{8}^{16}$, $\frac{7}{16}^{14}$, $\frac{1}{2}^{12}$, and S.A.E. Standard $\frac{1}{4}^{20}$, $\frac{5}{16}^{18}$, $\frac{3}{8}^{16}$, $\frac{7}{16}^{14}$, $\frac{1}{2}^{12}$	Plug	6	15	12	\$40.00	\$10.00	\$2.00
611	8 Sizes U. S. Standard $\frac{1}{4}^{20}$, $\frac{5}{16}^{18}$, $\frac{3}{8}^{16}$, $\frac{7}{16}^{14}$, $\frac{1}{2}^{12}$, $\frac{5}{8}^{11}$, $\frac{3}{4}^{10}$, and S.A.E. Standard $\frac{1}{4}^{20}$, $\frac{5}{16}^{18}$, $\frac{3}{8}^{16}$, $\frac{7}{16}^{14}$, $\frac{1}{2}^{12}$, $\frac{5}{8}^{11}$, $\frac{3}{4}^{10}$	Plug	6	15	16	70.00	10.00	2.00

Little Giant ADJUSTABLE DIES REVERSIBLE



FIG. 241

We recommend the adoption of the A.S.M.E. standard which will be sent unless otherwise specified.

Sizes, dimensions and threads not listed are subject to special prices.

Left hand dies are special.

MACHINE SCREW SIZES

Screw Gauge No.	Diam. Collet Price dies for each size		Number of Threads to the Inch	
			A. S. M. E.	
	1 1/4"	1 5/8"	Stand-ard	Also furn.
2	\$.75	...	64	56
3	.75	...	56	48
4	.75	...	48	36, 40
5	.75	...	44	36, 40
6	.75	...	40	32, 36
7	.75	...	36	30, 32
8	.75	...	36	30, 32
9	.75	...	32	24, 30
10	.75	...	30	24, 32
12	.75	...	28	24
14	.75	\$1.00	24	20
16	.75	1.00	22	20
18	...	1.00	20	18
20	...	1.00	20	18

FRACTIONAL SIZES

United States Standard form of thread furnished unless otherwise specified.

Sizes, dimensions and threads not listed are subject to special prices. Left hand dies are special.

Little Giant STOCKS AND COLLETS FOR SCREW PLATES



FIG. 242

These stocks are used in all Little Giant Screw Plates except full mounted. In each of these assortments one stock accommodates all the collets regardless of the sizes of the dies, except in a very few cases where a wide range of cutting sizes necessitates the use of two stocks.

Stocks if so specified will be furnished with die and collet, making a complete equipment for cutting any one size.

Standard Sizes

Collet No.	Outside Diameter, in.	Dimensions of Slot, inches	Takes Dies Following Sizes
A1	1 1/4	2 1/2 x 3/4	All Sizes A1 Die
A10	1 5/8	2 1/2 x 1 1/8	All Sizes A10 Die
1/4 No. 1	2	2 1/2 x 1 3/8	1/8, 1/4, 1/2
3/8 No. 1	2	2 1/2 x 1 3/8	3/8, 1/2, 5/8
1/2 No. 5	2 3/4	2 1/2 x 1 3/8	1/2, 3/4, 1
3/4 No. 5	2 3/4	2 1/2 x 1 3/8	3/4, 1, 1 1/4
1 No. 5	2 3/4	2 1/2 x 1 3/4	1, 1 1/4, 1 1/2
1 1/8 No. 5	2 3/4	*1 1/2 x 2 1/8	1 1/8, 1 1/4, 1 1/2, 1 3/4
1 1/4 No. 20	4	2 1/2 x 1 3/4	1 1/4, 1 1/2, 1 3/4, 1 7/8
1 1/2 No. 20	4	*1 1/2 x 2 1/4	1 1/2, 1 3/4, 1 7/8, 2
1 3/4 No. 20	4	1 1/4 x 2 1/2	1 3/4, 1 7/8, 2, 2 1/8
2 No. 25	4 1/2	*1 3/4 x 2 1/8	2, 2 1/8, 2 1/4, 2 1/2
1 1/2 No. 25	4 1/2	1 1/2 x 2 1/2	1 1/2, 1 3/4, 1 7/8, 2
1 3/8 No. 25	4 1/2	1 1/2 x 3	1 3/8, 1 3/4, 1 7/8, 2

*Round Ends

FRACTIONAL SIZES

Cutting Sizes	Diam. Collets Price Die Each Size			Number of Threads to the Inch			
				Standard Pitches			Other Threads Also Furnished
	1 1/4"	1 5/8"	2 1/4", 4", 4 1/2"	U.S.	S. A. E.	Whit.	U. S. Form
1/8	\$.75	...	...	64	...	60	72
3/16	.75	...	...	60	...	...	72
1/4	.75	...	...	50	...	48	48, 56
5/16	.75	...	...	48	...	...	56
3/8	.75	...	...	40	...	40	32
7/16	.75	...	...	40	...	...	...
1/2	.75	...	...	36	...	32	32
5/8	.75	...	...	32	...	...	...
3/4	.75	...	...	24	...	24	32
7/8	.75	...	1.00	24	...	...	...
1	.75	...	1.00	24	...	24	32
1 1/8	.75	...	1.00	24	...	...	...
1 1/4	.75	...	1.00	20	...	...	...
1 1/2	.75	1.00	1.00	20	28	20	24, 32
1 3/4	...	1.00	1.00	18	24	18	20, 32
2	...	1.25	1.25	16	24	16	20
2 1/4	...	...	1.25	14	20	14	24
2 1/2	...	...	1.50	13	20	12	12, 24
2 3/4	...	...	1.50	12	18	12	...
3	...	...	1.75	11	18	11	12
3 1/4	...	...	1.75	11	16	11	...
3 1/2	...	...	2.00	10	16	10	12
3 3/4	...	...	2.00	10	...	10	...
4	...	...	2.75	9	14, 18	9	12
4 1/4	...	...	2.75	9	...	9	...
4 1/2	...	...	2.75	8	14	8	12
4 3/4	...	...	4.00	7	12	7	...
5	...	...	4.00	7	12	7	...
5 1/4	...	...	5.00	6	12	6	...
5 1/2	...	...	5.00	6	12	6	...

In ordering dies specify diameter of collet.

†NOTE. 2" Diam. Collets take die sizes 1 1/8" - 1 1/2" incl.
2 3/4" Diam. Collets take die sizes 1 1/4" - 1" incl.
4" Diam. Collets take die sizes 5/8" - 1 1/4" incl.
4 1/2" Diam. Collets take die sizes 1 1/8" - 1 1/2" incl.

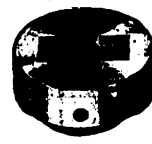


FIG. 243

A collet consists of a cap and guide only.

No. of Collet or Stock	Diam. Collet In.	Sizes of Dies	Price Each			Length of Stock Inches	Price of Stock
			Cap	Guide	Collet Complete		
A1	1 1/4	{ 2 - 16 }	\$.25	\$.15	\$.40	7 1/2	\$1.00
A10	1 5/8	{ 14 - 24 }	.30	.20	.50	13 1/2	1.25
1	2	{ 1/4 - 1/2 }	.30	.20	.50	14 1/2	1.50
5	2 3/4	{ 1/4 - 1 }	.50	.20	.70	23	3.00
7	2 3/4	{ 1/4 - 1 }	.50	.20	.70	26	3.00
9	2 3/4	{ 1/4 - 1 }	.50	.20	.70	29	3.00
20	4	{ 5/8 - 1 1/4 }	1.00	.50	1.50	40	6.00
25	4 1/2	{ 3/4 - 1 1/2 }	1.50	.50	2.00	52	8.00

RUSSELL OPENING DIE SCREW PLATES



DIE, FIG. 224

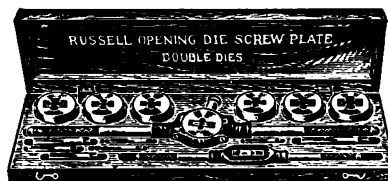


FIG. 222



COLLET, FIG. 223

These Screw Plates have been designed to fill a demand for a simple Quick-Opening Die for threading bolts by hand. For simplicity of construction and quickness of operation these Screw Plates cannot be excelled.

The Dies are opened or closed by a single movement of the lever on the side of the stock. When a thread has been cut to

the required length, the operator pushes the lever, thus throwing the Dies open clear of the thread and the whole tool is quickly lifted off the finished work. When free of the work, the reversing of the lever closes the Dies exactly to size again ready to cut another thread.

SINGLE STOCK WITH EITHER U. S. STANDARD OR S. A. E. STANDARD THREADS

Set No.	Cutting Sizes	Taps	Dia. Collets Inches	Length Stock Inches	Adj. Tap Wrench Length Inches	Price Set
11	5 Sizes $\frac{1}{4}$, $\frac{5}{16}$, $\frac{3}{8}$, $\frac{7}{8}$, $\frac{1}{2}$	Plug	$2\frac{3}{4}$	26	11	\$18.50
22	5 Sizes $\frac{1}{4}$, $\frac{3}{8}$, $\frac{1}{2}$, $\frac{5}{8}$, $\frac{3}{4}$	Plug	$2\frac{3}{4}$	26	16	22.75
44	5 Sizes $\frac{1}{2}$, $\frac{5}{8}$, $\frac{3}{4}$, $\frac{1}{2}$, 1	Plug	$2\frac{3}{4}$	26	21	29.25
55	7 Sizes $\frac{1}{4}$, $\frac{5}{16}$, $\frac{3}{8}$, $\frac{7}{8}$, $\frac{1}{2}$, $\frac{5}{8}$, $\frac{3}{4}$	Plug	$2\frac{3}{4}$	26	16	27.50
66	7 Sizes $\frac{3}{8}$, $\frac{1}{2}$, $\frac{5}{8}$, $\frac{3}{4}$, $\frac{1}{2}$, $\frac{5}{8}$, 1	Plug	$2\frac{3}{4}$	26	21	35.00
77	9 Sizes $\frac{1}{4}$, $\frac{5}{16}$, $\frac{3}{8}$, $\frac{7}{8}$, $\frac{1}{2}$, $\frac{5}{8}$, $\frac{3}{4}$, $\frac{1}{2}$, 1	Plug	$2\frac{3}{4}$	26	21	42.00

(Specify which thread wanted).

FOR AUTOMOBILE WORK WITH BOTH U. S. STANDARD AND S. A. E. STANDARD THREADS

Set. No.	Cutting Sizes	Taps	Dia. Collets Inches	Length Stock, Inches	Adj. Tap Wrench Length Inches	Price Set
111	5 Sizes U. S. Std. $\frac{1}{4}$ ²⁰ , $\frac{5}{16}$ ¹⁸ , $\frac{3}{8}$ ¹⁶ , $\frac{1}{2}$ ¹⁴ , $\frac{1}{2}$ ¹² , and S. A. E. Std. $\frac{1}{4}$ ²⁸ , $\frac{5}{16}$ ²⁴ , $\frac{3}{8}$ ²⁴ , $\frac{1}{2}$ ²⁰	Plug	$2\frac{3}{4}$	26	11	\$29.25
155½	8 Sizes U. S. Std. $\frac{1}{4}$ ²⁰ , $\frac{5}{16}$ ¹⁸ , $\frac{3}{8}$ ¹⁶ , $\frac{1}{2}$ ¹⁴ , $\frac{1}{2}$ ¹² , $\frac{5}{8}$ ¹² , $\frac{3}{4}$ ¹⁰ , and S. A. E. Std. $\frac{1}{4}$ ²⁸ , $\frac{5}{16}$ ²⁴ , $\frac{3}{8}$ ²⁴ , $\frac{1}{2}$ ²⁰ , $\frac{1}{2}$ ¹⁸ , $\frac{5}{8}$ ¹⁸ , $\frac{3}{4}$ ¹⁶	Plug	$2\frac{3}{4}$	26	16	56.00

WITH S. A. E. STANDARD THREADS

Set No.	Cutting Sizes	Taps	Dia. Collets Inches	Length Stock, Inches	Adj. Tap Wrench Length Inches	Price Set
770	11 Sizes, $\frac{1}{4}$ ²⁸ , $\frac{5}{16}$ ²⁴ , $\frac{3}{8}$ ²⁴ , $\frac{1}{2}$ ²⁰ , $\frac{5}{8}$ ¹⁸ , $\frac{1}{2}$ ¹⁸ , $\frac{3}{4}$ ¹⁶ , $\frac{7}{8}$ ¹⁴ , 1 ¹⁴ ,.....	Plug	$2\frac{3}{4}$	26	21	\$48.25

Left-hand Taps and Dies furnished at special prices.

LIST PRICES OF DIES FOR OPENING DIE SCREW PLATES

Dia. in.	Price of Die	No. of Threads to Inch		
		U. S. Standard	Whitworth Standard	S.A.E. Standard
$\frac{1}{16}$	\$1.00	24	24	..
$\frac{1}{8}$	1.00	20	20	28
$\frac{3}{16}$	1.00	18	18	24
$\frac{1}{4}$	1.25	16	16	24
$\frac{5}{16}$	1.25	14	14	20
$\frac{3}{8}$	1.50	13	12	20
$\frac{7}{16}$	1.50	12	12	18
$\frac{1}{2}$	1.75	11	11	18
$\frac{5}{8}$	1.75	11	11	16
$\frac{3}{4}$	2.00	10	10	16
$\frac{7}{8}$	2.00	10	10	..
1	2.75	9	9	14
$1\frac{1}{8}$	2.75	9	9	..
$1\frac{1}{4}$	2.75	8	8	14

OPENING DIE STOCK



FIG. 225

No. 14 Stock 26 in. long for Collets $2\frac{3}{4}$ in. diameter.... \$3.00

PRICE OF COLLETS

	Guide	Cap	Complete
No. 38 $\frac{1}{4}$ to 1 in., $2\frac{3}{4}$ in. diameter.	\$0.20	\$0.50	\$0.70

In ordering, give cutting size of Die for which Collet is wanted.

NOTE: A complete Collet consists of a Cap and a Guide.

WELLS SELF-OPENING DIE—MODEL T—RIM TRIP

WITH FLOATING SHANK PERMITTING INDEPENDENT LEAD

Model T is adaptable to all machines where the Die revolves; such as drill presses, multiple screw machines, bolt cutters, etc.

This model is closed either by having a "yoke" push the outer shell forward, after the Die backs off the work, or, it can be closed by a stop bearing upon one side only.

In the Wells Self-Opening Die an entirely new type of design avoids the troubles that have hitherto characterized automatic opening dies and brings forward a self-opening die that has repeatedly "made good" where others have failed, and in "making good" it has also demonstrated a productive capacity at least twice that of ordinary dies.

Distinguishing characteristics:

Every chaser has a solid support directly opposite the teeth which do the cutting. Chasers cannot squirm away from their work.

Every chaser is about 4 times as long as the threaded section, giving such an abundance of longitudinal support as to make tipping or tilting impossible.

Every chaser is adjusted after the hardening process, thus correcting any changes which may have occurred therein.

The wear, what little there is, falls on the back edge of the chaser; is uniform upon all in the set, and does not affect the accuracy of the die-head itself, making its life practically unlimited.

The heavy, hardened steel shell which holds the chasers to their work, gives exceptional strength.

It has a simple, positive and instantaneous adjustment, registering variations of $\frac{1}{4}$ thousandth of an inch.

Because of these points it is capable of a higher cutting speed than any other type or style of die, without affecting its accuracy.

It is adaptable to a wide range of machines and working conditions.

Die No.	840	841	842	843
Dimensions				
Head:				
Diameter (A)	$2\frac{1}{4}"$	$2\frac{1}{2}"$	$3\frac{1}{8}"$	$3\frac{7}{8}"$
Length (B)	$1\frac{1}{16}"$	$2\frac{1}{16}"$	$2\frac{1}{16}"$	$2\frac{1}{16}"$
Shank:				
Diameter (C)	$\frac{5}{8}"$	$\frac{3}{4}"$	$1"$	$1\frac{1}{4}"$
Length (D)	$1\frac{1}{2}"$	$2\frac{1}{2}"$	$3"$	$3\frac{1}{4}"$
Over All length (E)	$4\frac{1}{8}"$	$5\frac{1}{8}"$	$6\frac{3}{8}"$	$6\frac{3}{4}"$
Capacity				
Bolt or Screw Threads	0" to $\frac{1}{4}"$	$\frac{1}{8}"$ to $\frac{1}{2}"$	$\frac{1}{4}"$ to $\frac{3}{4}"$	$\frac{3}{8}"$ to 1"
Pipe Threads		$\frac{1}{8}"$	$\frac{1}{8}"$ to $\frac{3}{4}"$	$\frac{1}{4}"$ to $\frac{3}{4}"$
Length Thread				
Solid Shank	$1\frac{1}{2}"$	$1\frac{1}{2}"$	$2\frac{1}{2}"$	$2\frac{1}{2}"$
Price				
Die, with one set of alloy steel chasers	\$25.00	\$35.00	\$45.00	\$55.00
Die, with assortment of extra chasers and bench block	8 sets \$33.50 12 sets \$44.25	6 sets \$45.00 12 sets \$57.00	9 sets \$65.00	9 sets \$79.00
Extra chasers, per set	\$1.75	\$2.00	\$2.50	\$3.00

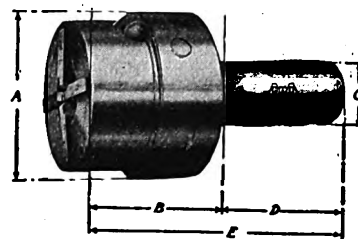


FIG. 236

SPECIAL FEATURES

Friction is reduced to a minimum by the construction of the Die, which, in addition to its unequalled smooth cutting qualities, permits the lubricant to enter through the shank and flood the track of the cutting teeth with an ample stream. Chips are thus washed out of the Die instead of being left to work into the movable parts.

Sharpening of the chasers is a simple matter on an ordinary grinder, because all sides and angles are get-at-able. This feature prolongs the life of the chasers many fold, bringing about an appreciable economy in operating costs.

Re-hobbing of old chasers that have been worn and ground until the teeth are gone, is also practicable, by annealing and re-hobbing for a larger size.

By the insertion of a set of suitably ground chasers the Die is transformed into an excellent Hollow Milling Tool. The strong, solid support on the back of each chaser, directly opposite the cutting face, gives to the tool the strength and ruggedness of a solid hollow mill; yet provides means for instant adjustment to any degree of accuracy. Worn out threaded chasers can be utilized for hollow milling by re-grinding.

SPECIAL NOTE

Solid Shanks regularly furnished.

Hollow shank substituted without extra charge. Hollow shank will permit the cutting of any length of thread.

When ordering chasers specify thread diameter, pitch and form, also material upon which it is to be used (for instance, 1"-8 U. S. S. for threading rolled brass).

Sizes and pitches regularly furnished shown on page 80.

Hollow mill chasers can be furnished at above prices.

FOR POWER DRIVEN BOLT AND PIPE THREADING MACHINES SEE PAGES 809 AND 810

THE ACORN DIE



FIG. 231

The Acorn Die, by means of its various holders, is adapted to all kinds of machines: lathes, drill presses, hand or automatic screw machines, turret lathes, bolt cutters, etc.

The adjusting cap is bevelled on the inside to fit the corresponding bevel on the prongs of the die. By turning this threaded cap the correct adjustment is instantly obtained, all the prongs converging equally toward the center.

When the adjustment is correct the cap is held in position by the lock nut immediately back of it.

The die is held in perfect alignment with the shank. The dies are uniform in length. This means that once a machine is set, a die may be removed for sharpening, a new die set in its place and the machine is ready at once for threading to exactly the same length.

The Acorn Die can be ground even more easily and quickly than a spring die. The grinding is done in the flutes, on the cutting faces.

DIES ONLY

In ordering dies specify both number and cutting size.

No. of Die	Capacity		Pipe	Diam. Blank Inches	Length Inches	Price Each Die
	Mch. Screw	Fractional				
0	0-4	$\frac{1}{16}$ - $\frac{7}{16}$		$\frac{3}{8}$	$\frac{3}{8}$	\$1.50
1	4-12	$\frac{1}{8}$ - $\frac{3}{4}$		$\frac{5}{8}$	$\frac{1}{2}$	1.75
2	14-28	$\frac{1}{4}$ - $\frac{1}{2}$	$-\frac{1}{8}$	$\frac{7}{8}$	$\frac{7}{8}$	2.00
3	30	$\frac{3}{8}$ - $\frac{1}{2}$	$\frac{1}{4}$ - $\frac{3}{8}$	$1\frac{1}{4}$	$1\frac{1}{4}$	2.25
4		$\frac{1}{2}$ - 1	$\frac{1}{2}$ - $\frac{3}{4}$	$1\frac{3}{4}$	$1\frac{3}{4}$	2.75

To accommodate the Acorn Die to the present types of button, spring and floating die holders, also Brown & Sharpe button and floating die holders, we can furnish upon short notice holders with shanks $\frac{5}{8}$ ", $\frac{11}{16}$ ", 1", $1\frac{1}{4}$ ", $1\frac{1}{2}$ ", $1\frac{3}{4}$ ", and 2" in diameter.

HOLDERS

REGULAR ACORN DIE HOLDER

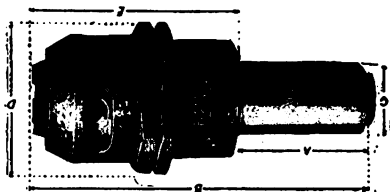


FIG. 233

All parts of the holders are made of steel and hardened.

The regular Acorn Die Holder shown is of a smaller diameter than any other die holder of equal cutting size. It has a longitudinal float, permitting the die to follow its own lead independent of any lag in the travel of the machine.

This holder may be used effectively on practically all automatic screw machines and any other machines which provide for automatically reversing the die or rod at the instant when the desired length of thread has been cut.

No. Holder	No. Die	Lengths		Diameters		Length Thread will Cut Inches	Price Holder only
		Shank (A) Inches	Body Inc. Die (E) Inches	Shank (C) Inches	Body (D) Inches		
700	0	$1\frac{1}{8}$, 2	$1\frac{1}{2}$	$\frac{5}{8}$, $\frac{3}{4}$	$\frac{7}{8}$	$\frac{7}{8}$	\$3.00
701	1	$1\frac{1}{8}$, 2	$1\frac{1}{2}$	$\frac{5}{8}$, $\frac{3}{4}$	$1\frac{1}{2}$	$1\frac{1}{2}$	4.00
702	2	2, 3	$2\frac{1}{16}$	$\frac{7}{8}$, 1	$1\frac{3}{4}$	$1\frac{1}{8}$	5.00
703	3	3, 3	$3\frac{1}{16}$	$1\frac{1}{4}$, $1\frac{1}{2}$	$2\frac{1}{8}$	$2\frac{3}{8}$	10.00
704	4	$3\frac{3}{8}$	$4\frac{1}{16}$	$1\frac{1}{4}$, $1\frac{1}{2}$	$2\frac{1}{8}$	$3\frac{3}{8}$	15.00

OTHER HOLDERS FURNISHED

The Releasing Type of Holder for the Acorn Die can also be furnished. This type of holder is particularly valuable where the die is required to cut threads of uniform length or close to shoulder. The Acorn adapter can also be supplied, an appliance by means of which Acorn Dies may be used in machines or holders already in operation.

REGULAR SIZES AND PITCHES FOR THE ACORN DIE AND THE WELLS SELF-OPENING DIE, PAGE 79

Sizes, dimensions and threads not listed are special and subject to special prices. Left hand dies are special.

Machine Screw Sizes

Screw Gauge No.	Number of Threads to Inch		Screw Gauge No.	Number of Threads to Inch	
	A. S. M. E. Standard	Also Furnished		A. S. M. E. Standard	Also Furnished
0	80		8	36	30, 32
1	72	64	9	32	24, 30
2	64	56	10	30	24, 32
3	56	48	12	28	24
4	48	36, 40	14	24	20
5	44	36, 40	16	22	20
6	40	32, 36	18	20	18
7	36	30, 32	20	20	18

Fractional Sizes

United States Standard threads furnished unless otherwise ordered.

Cutting Size In.	Number of Threads to Inch				Cutting Size In.	Number of Threads to Inch			
	Standard Pitches			U. S. Form Threads Also Furnished		Standard Pitches			U.S. Form Threads Also Furnished
	U.S. Std.	S.A.E. Std.	Whit. Std.			U.S. Std.	S.A.E. Std.	Whit. Std.	
$\frac{1}{8}$	64		60	72	$\frac{9}{16}$	12	18	12	27
$\frac{9}{16}$	60			72	$\frac{5}{8}$	11	18	11	12, 27
$\frac{3}{16}$	50		48	48	$\frac{11}{16}$	11	16	11	
$\frac{7}{16}$	48				$\frac{3}{4}$	10	16	10	12, 27
$\frac{1}{2}$	40		40	32	$\frac{13}{16}$	10		10	
$\frac{5}{8}$	40				$\frac{7}{8}$	9	14, 18	9	12, 27
$\frac{5}{16}$	36		32	32	$\frac{15}{16}$	9		9	
$\frac{11}{16}$	32				1	8	14	8	12, 27
$\frac{3}{4}$	24		24	32	$1\frac{1}{8}$	7	12	7	
$\frac{13}{16}$	24				$1\frac{1}{4}$	7	12	7	
$\frac{7}{8}$	24		24	32	$1\frac{3}{8}$	6	12	6	
$\frac{15}{16}$	24				$1\frac{1}{2}$	6	12	6	
$\frac{1}{4}$	20	28	20	24, 27, 32	$1\frac{5}{8}$	5	$5\frac{1}{2}$	5	
$\frac{9}{16}$	18	24	18	20, 27, 32	$1\frac{3}{4}$	5		5	
$\frac{5}{8}$	16	24	16	20, 27	$1\frac{7}{8}$	5		5	
$\frac{3}{16}$	16	24	16	20, 27		4		4	$4\frac{1}{2}$
$\frac{7}{16}$	14	20	14	24, 27	2	$4\frac{1}{2}$		$4\frac{1}{2}$	
$\frac{1}{2}$	13	20	12	12, 24, 27					

Pipe Sizes: Briggs standard right hand threads furnished unless otherwise specified. Whitworth threads (right hand) furnished at regular prices. Left hand threads are special.

Cutting sizes, Acorn Die $\frac{1}{8}$ ", $\frac{1}{4}$ ", $\frac{3}{8}$ ", $\frac{1}{2}$ ", $\frac{3}{4}$ ".

Cutting sizes, W. S. O. D. $\frac{1}{8}$ ", $\frac{1}{4}$ ", $\frac{3}{8}$ ", $\frac{1}{2}$ ", $\frac{3}{4}$ ", 1", $1\frac{1}{4}$ ", $1\frac{1}{2}$ ".

Fine Pitch for Brass: American standard (all 27 straight threads) right hand dies furnished unless otherwise specified. British standard (26 threads) furnished at regular prices. Cutting sizes, $\frac{1}{4}$ ", $\frac{1}{8}$ ", $\frac{3}{8}$ ", $\frac{1}{2}$ ", $\frac{3}{4}$ ", $\frac{5}{8}$ ", $\frac{3}{4}$ ", $\frac{7}{8}$ ", 1".

ADJUSTABLE ROUND SPLIT DIES

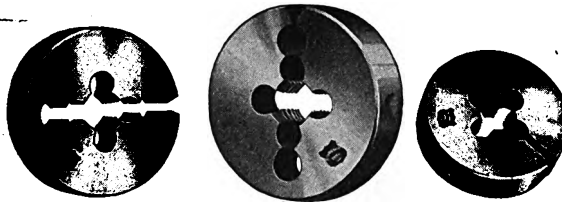


FIG. 240

MACHINE SCREW SIZES
A. S. M. E. STANDARD
NO. 134 F

We recommend the adoption of this standard.

Sizes, dimensions and threads not listed are subject to special prices.

Left hand dies are special.

FRACTIONAL SIZES
NO. 134 G

U. S. form of thread furnished unless otherwise specified. Sizes, dimensions and threads not listed are subject to special prices.

Left hand dies are special.

SIZES AND PRICES

SIZES AND PRICES

Screw Gauge No.	Number of Threads to the Inch Outside Diameter—Price Each					
	Standard	Special	Also Fur.	½ Inch	⅝ Inch	1 Inch
0	80	..	..	\$0.80	\$0.90	.....
1	72	64	56	.80	.90	.....
2	64	56	..	.70	.80	.....
3	56	48	..	.60	.70	.....
4	48	36, 40	32	.50	.60	.....
5	44	36, 40	..	.50	.60	.....
6	40	32, 36	..	.50	.60	\$0.75
7	36	30, 32	..	.50	.60	.75
8	36	30, 32	40	.50	.60	.75
9	32	24, 30	..	.50	.60	.75
10	30	24, 32	28	.50	.60	.75
12	28	24	32	.50	.60	.75
14	24	20	..	.50	.60	.75
16	22	20	18	.....	.60	.75
18	20	18	..	.....	.60	.75
20	20	18	16	.....	.60	.75

Cutting Size Inch	Number of Threads to the Inch				Other U. S. Threads Also Furnished	Outside Diameter Price Each		
	Standard Pitches					% In.	½ In.	1 In.
	U. S.	S.A.E.	Whit- worth	V Form				
1/16	64	..	60	..	72	\$0.80	\$0.90	.....
1/8	60	..	..	..	72	.70	.80	.....
3/16	50	..	48	..	48	.60	.70	.....
1/4	48	..	..	..	..	.50	.60	.....
5/16	40	..	40	..	32	.50	.60	\$0.75
3/8	40	..	..	..	..	.50	.60	.75
7/16	36	..	32	..	32	.50	.60	.75
1/2	32	..	..	..	..	.50	.60	.75
5/8	24	..	24	24	32	.50	.60	.75
3/4	24	..	..	..	..	.50	.60	.75
7/8	24	..	24	24	32	.50	.60	.75
1	24	..	..	..	..	.50	.60	.75
1 1/8	20	28	20	20	24,27,32	.50	.60	.75
1 1/4	18	24	18	18	20,27,32	....	.60	.75
1 1/2	16	24	16	16	20,27	....	....	.75
1 3/4	14	20	14	14	24,27	....	....	.75

FRACTIONAL SIZES

NO. 134 H

1½ INCH OUTSIDE DIAMETER

2 INCH OUTSIDE DIAMETER

United States Standard form of thread furnished unless otherwise specified.

Sizes, dimensions and threads not listed are subject to special prices.

Left hand dies are special.

SIZES AND PRICES

Cutting Size Inch	Number of Threads to the Inch				Other U. S. Threads Also Furnished	Outside Diameter Price Each	
	Standard Pitches					1½ In.	2 In.
	U. S.	S.A.E.	Whitworth	V Form			
¼	20	28	20	20	24,27,32	\$1.00	\$1.25
⅜	18	24	18	18	20,27,32	1.00	1.25
½	16	24	16	16	20,27	1.00	1.25
⅝	14	20	14	14	24,27	1.00	1.25
¾	13	20	12	12	12,24,27	1.00	1.25
7/8	12	18	12	12	27	1.00	1.50
1	11	18	11	11	12,27	1.00	1.50
1 1/8	11	16	11	..	..	....	1.75
1 1/4	10	16	10	10	12,27	....	1.75
1 1/2	10	..	10	..	..	....	2.00
1 3/4	9	14-18	9	9	12,27	....	2.00

SOLID HEXAGON DIES



FIG. 237

These dies are used principally for repair work, and for dressing over bruised or rusty threads, and will go into any space that Hexagon Nuts will go into.

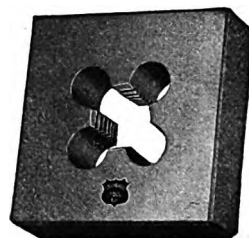
They can be used in bit-brace sockets, ratchet or monkey-wrenches, and will be found convenient in many ways.

They are accurate, durable and will give satisfactory service.

United States Standard threads recommended and furnished unless otherwise ordered.

Size	Threads per Inch			Size of Die		Price Each
	U. S. Std.	S.A.E. Std.	Whit. Std.	Across Flats	Thickness	
1/4	20	28	20	1 1/8	1/4	\$.60
5/16	18	24	18	1 1/8	3/8	.65
3/8	16	24	16	1 1/8	1/2	.70
1/2	14	20	14	1 7/8	3/4	.75
5/8	13	20	12	1 7/8	1 1/2	.80
3/4	12	18	12	1 7/8	1 1/2	.85
7/8	11	18	11	1 7/8	1 3/4	.90
1	11	16	11	1 7/8	1 3/4	.95
1 1/8	10	16	10	1 7/8	1 3/4	1.00
1 1/4	9	14	9	1 7/8	1 3/4	1.10
1 1/2	8	14	8	1 7/8	1 3/4	1.20
1 3/4	7	12	7	2	1	1.40
1 7/8	7	12	7	2 1/8	1	1.60
2	6	12	6	2 3/8	1	1.80
2 1/2	6	12	6	2 7/8	1	2.00
...

SOLID SQUARE BOLT DIES



NO. 134B—FIG. 239

U. S. Standard threads furnished unless otherwise ordered. Sizes, dimensions and threads not listed are subject to special prices.

Left hand dies are special and subject to special prices.

SIZES AND PRICES

Cutting Size In.	No. Threads to the In.	Size of Square Inches	Thickness Inches	Price Each
				U. S. Std.
1/4	20	2 1/2	1/2	\$1.80
5/16	18	2 1/2	1/2	1.80
3/8	16	2 1/2	1/2	1.80
1/2	14	2 1/2	1/2	1.80
5/8	13	2 1/2	3/4	1.80
3/4	12	2 1/2	3/4	1.90
7/8	11	2 1/2	3/4	2.00
1	11	2 1/2	3/4	2.10
1 1/8	10	2 1/2	3/4	2.20
1 1/4	10	2 1/2	3/4	2.30
1 1/2	9	2 1/2	3/4	2.40
1 3/4	9	2 1/2	3/4	2.55
1 7/8	8	2 1/2	1	2.70
2	7	2 1/2	1	3.00
2 1/8	7	2 1/2	1	3.30
2 1/4	6	2 1/2	1	3.60
2 1/2	6	3	1	3.90
2 3/4	5 1/2	3	1	4.20
3	5	3	1 1/4	5.40
3 1/4	5	3 1/2	1 1/2	6.50
3 1/2	5	3 3/4	2	7.50

DROP-FORGED SQUARE PIPE DIES

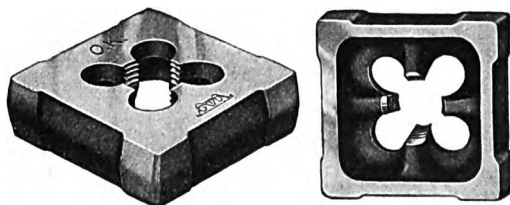


FIG. 238

These Dies are regularly furnished in Briggs Standard right hand thread.

Sizes, dimensions and threads not listed are subject to special prices.

Right and Left Hand Pipe Dies are furnished at the same list.

These dies will fit the square die stocks of any manufacture.

SIZES AND PRICES

No.	Size of Square Inches	Thickness Inches	Range of Sizes, Inches	Price
0	2	1/2	1/8, 1/4, 3/8, 1/2	\$1.40
1	2 1/2	3/4	1/8, 1/4, 3/8, 1/2, 3/4, 1	1.60
1 1/2	3	3/4	1/4, 3/8, 1/2, 3/4, 1, 1 1/4	2.00
2	4	7/8	1/2, 3/4, 1, 1 1/4, 1 1/2, 2	2.50
3	5	1 1/4	2 1/2, 3	9.00

Extra chip clearance makes Dies cut easy. No torn threads. Plenty of room for oiling. This means smooth threads. Patented construction gives maximum strength with less weight. Made from carbon tool steel of good quality which is still further toughened and refined by special forging process.

SOLID PIPE STOCKS AND DIES

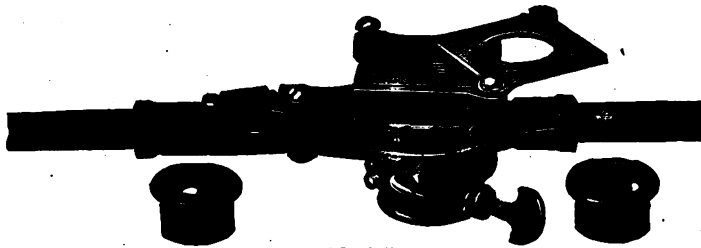


FIG. 247

No.	Threads Pipe Inches	Dimensions of Dies Inches	Price Complete Each	Price Stocks only Each	Price Extra Dies Each	Price, Extra Bushings Each	Price Die Frames Each
0	$\frac{1}{8}$ to $\frac{1}{2}$	2 x $\frac{1}{2}$	\$ 8.00	\$ 3.00	\$1.40	\$0.30	....
1	$\frac{1}{4}$ " 1	2 $\frac{1}{2}$ x $\frac{3}{4}$	10.50	3.50	1.60	.40	\$0.30
1 $\frac{1}{2}$	$\frac{3}{4}$ " 1 $\frac{1}{4}$	3 x $\frac{3}{4}$	9.50	4.00	2.00	.60	.40
1 $\frac{3}{4}$	1 " 1 $\frac{1}{2}$	3 x $\frac{3}{4}$	9.50	4.00	2.00	.60	.40
2	1 $\frac{1}{4}$ " 2	4 $\frac{1}{8}$ x $\frac{7}{8}$	14.50	8.50	2.50	.75	.50
3	2 $\frac{1}{2}$ " 3	5 x 1 $\frac{1}{4}$	35.00	20.00	9.00	2.00	.60
4	2 $\frac{1}{2}$ " 3	5 x 1 $\frac{1}{4}$	42.00	26.00	9.00	2.00	.60

Nos. 2, 3, 4 have leader screw attachment. No. 4 has four arms.

Little Giant PIPE STOCKS AND DIES

FIG. 3858

The Little Giant Adjustable Die is a great convenience. It saves much time, money and bother in threading pipe. Only a minute is needed to adjust the die for slight variations in diameter. The dies are reversible to cut close to a shoulder, wall, nipple or other obstruction. The bushings are also removable to pass couplings, etc.

The dies can be set quickly to cut larger or smaller threads. A slight turn of each of the adjusting screws pressing against the dies gives the adjustment. Standard marks on stock and dies make quick re-setting possible.

The illustration shows the construction. Simplicity is the feature. The dies are wedged by the beveled surfaces and when tightened are as solid as square dies. The steel in these dies is made from special high grade crucible tool steel. A special heat treatment refines and toughens the steel, making the dies long lived and easy cutting.

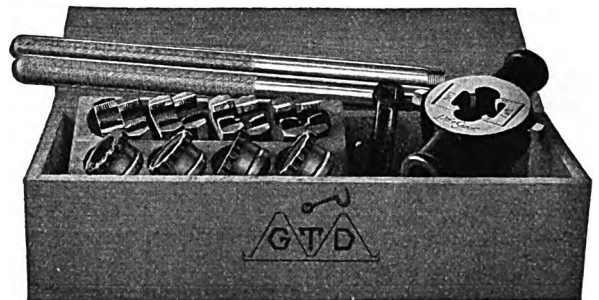


FIG. 3859

Regularly furnished with a Little Giant Stock, Little Giant Dies and bushings for each size.

Briggs Standard right hand taper threads furnished unless otherwise ordered.

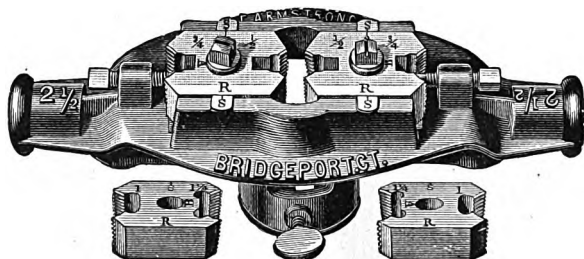
Right and left hand pipe dies are furnished at the same list.

Each assortment, with the exception of Nos. 263A, 263B and 263C, is packed in a plain substantial hinged box.

No.	Cutting Sizes, Inches	Length Stock Inches	Weight, Lbs.	Price Complete	Extra Dies Each	Extra Bushings Each
260	$\frac{1}{8}$, $\frac{1}{4}$, $\frac{3}{8}$, $\frac{1}{2}$	22	6	\$ 9.00	\$ 1.60	\$0.30
261A	$\frac{1}{4}$, $\frac{3}{8}$, $\frac{1}{2}$, $\frac{3}{4}$, 1.....	36	12	12.00	2.00	.40
261B	$\frac{1}{2}$, $\frac{3}{4}$, 1.....	36	10	9.00	2.00	.40
261C	$\frac{1}{8}$, $\frac{1}{4}$, $\frac{3}{8}$, $\frac{1}{2}$, $\frac{3}{4}$, 1.....	36	13	14.00	2.00	.40
261 $\frac{1}{2}$ A	$\frac{1}{8}$, $\frac{1}{4}$, $\frac{3}{8}$, $\frac{1}{2}$, $\frac{3}{4}$, 1.....	41	12	14.00	3.50	.60
262B	1, 1 $\frac{1}{4}$, 1 $\frac{1}{2}$, 2.....	51	29	21.00	4.50	.75
263A	2 $\frac{1}{2}$	66	40	35.00	10.00	2.00
263B	3.....	66	40	35.00	10.00	2.00
263C	2 $\frac{1}{2}$, 3.....	66	44	45.00	10.00	2.00

When ordering Little Giant dies mention the stock by number.

ARMSTRONG'S PIPE STOCKS AND DIES



NO. 2½—FIG. 227

No.	Cutting Sizes, Inches	Weight Pounds	Price Complete	Extra Dies Each	Extra Bushings Each
1	1/8, 1/4, 3/8, 1/2 Right Hand Thread...	5 1/2	\$ 9.00	\$1.60	\$0.30
2	1/4, 3/8, 1/2, 3/4, 1 Right Hand Thread...	15	12.00	2.00	.40
2 1/2	1/2 x 3/4, 1 x 1 1/4 Right Hand Thread (double end)...	15	14.00	3.50	.60
†2 1/2 A	1/4, 3/8 (single end), 1/2 x 3/4, 1 x 1 1/4 Right Hand Thread (double end)...	19	20.00	3.50	.60
3	1 1/4, 1 1/2, 2 Right Hand Thread...	35	18.00	4.50	.75
3A	1, 1 1/4, 1 1/2, 2 Right Hand Thread...	40	21.00	4.50	.75
3B	1/2, 3/4, 1, 1 1/4, 1 1/2, 2 Right Hand Thread...	48	27.00	4.50	.75
3C	3/4, 1, 1 1/4, 1 1/2, 2 Right Hand Thread...	44	24.00	4.50	.75
6	2 1/2 x 3 R. H. Thread (double end)...	43	45.00	17.00	2.00
7	2 1/2 x 3, 3 1/2 x 4 Right Hand Thread (double end)...	78	75.00	20.00	3.00

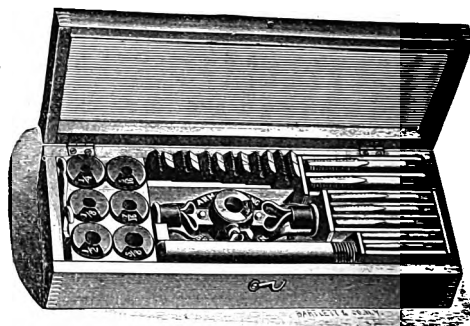


FIG. 5069

Sets Nos. 6 and 7 will not thread pipe smaller than 2 1/2 inches. †1/4 and 3/8 inch Dies. Price each \$2.50.

*Price is for set of dies, 2 pieces, except for No. 7 which covers four pieces. Nos. 1, 2 and 3 have single end dies. Nos. 2 1/2 and 6 have double end dies. No. 7 has eight double end dies; four pieces per set. Nos. 6 and 7 have four arms.

OSTER BULL DOG DIE STOCKS

This line of stocks has a positive setting arrangement without the use of any thumb screws or friction clamps of any kind. The dies are controlled by the lever handle on top, as shown in illustration. By moving this handle to the right as far as it will go, the dies are set and held in place while cutting. One movement of the top lever handle will open or close the dies. No resetting or backing off the threads.

The tool is equipped with adjustable guides which do away with loose bushings. These guides are operated on a scroll and can be set for all sizes the tool will thread. The scroll is constructed so that the guides are held in any position without locking. The more pressure on the ends of the guides, the more solid the locking arrangement. Great pressure on the ends of the guides only tends to lock them more firmly in position.

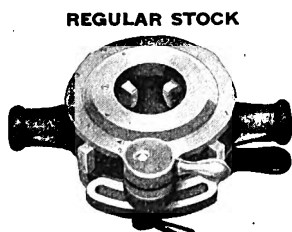


FIG. 244

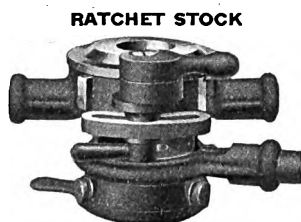


FIG. 245

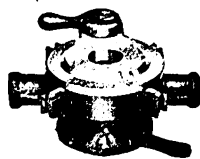


FIG. 246

Range of Sizes of Pipe, Inches				Regular Stocks		Ratchet Stocks		Extra Dies per Set (4 pcs)
One Set	One Set	One Set	One Set	No.	Price Each	No.	Price Each	
1/8	1/4 and 3/8	1/2 and 3/4	.....	101	\$13.00	.....	.....	\$2.50
1/4 and 3/8	1/2 " 1 1/4	1 " 1 1/4	.....	102	17.00	102R	\$20.00	3.00
1	1 1/2 " 2	1 1/2 " 2	.....	103	22.00	103R	27.00	3.50
1 1/2 " 2	1 " 1 1/4	1 1/2 and 2	.....	104	25.00	104R	30.00	3.50
1 1/2 " 2	1 1/2 " 3	1 " 1 1/4	1 1/2 and 2	104 1/2	28.00	104 1/2 R	33.00	3.50
1 1/2 " 2	2 1/2 " 3	.....	.....	105	40.00	105R	50.00	5.00
1 " 1 1/4	1 1/2 " 2	2 1/2 and 3	.....	105 1/2	43.00	105 1/2 R	53.00	5.00
2 1/2 " 3	3 1/2 " 4	.....	.....	107	55.00	107R	60.00	6.00
1 1/2 " 2	2 1/2 " 3	3 1/2 and 4	.....	107 1/2	58.50	107 1/2 R	63.50	6.00
.....	2 1/2 " 3	3 1/2 " 4	4 1/2 and 5	.....	.....	108R	75.00	10.00
1 1/2 " 2	2 1/2 " 3	3 1/2 " 4	4 1/2 " 5	.....	.....	108 1/2 R	80.00	10.00

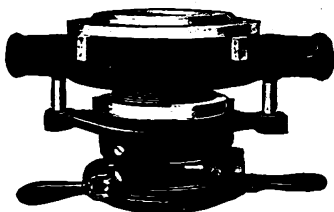
BULLDOG DIE STOCKS, NO. 82

This tool has brand new features. The double-end dies (1/4 and 3/8-inch on one end — 1/2 and 3/4 inch on the other) are protected by a casing; hence teeth cannot cut user's hands or be damaged when stock is thrown about.

The dies have a stop on each side so that they cannot be set beyond proper place in stock.

Price, Complete, Cutting 1/4, 3/8, 1/2 and 3/4 inch.....each	\$13.00
" Extra Dies Right or Left.....per set (four pieces)	3.50
" " for 1/8-inch Dies....."	3.50

OSTER MATCHLESS DIE STOCKS

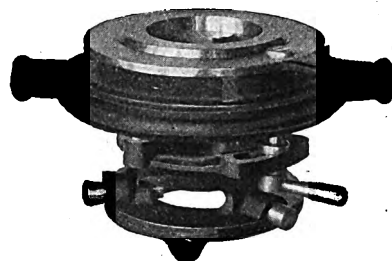


NO. 3B—FIG. 248

Receding dies. No loose bushings. No change of guides. Easy cutting dies. Protected leader screw.

Number.....	1B	3B	*3BR	*4BR
Threads Pipe,...inches	$\frac{1}{2}$ to $\frac{3}{4}$	1 to 2	1 to 2	$2\frac{1}{2}$ to 4
Weight, pounds.....	10	25	36	120
Price, Complete...each	\$14.50	\$30.00	\$35.00	\$80.00
" Extra Dies, per set	2.50	3.50	3.50	10.00

*Ratchet.



NO. 4BR—FIG. 249

OSTER GEARED DIE-STOCKS

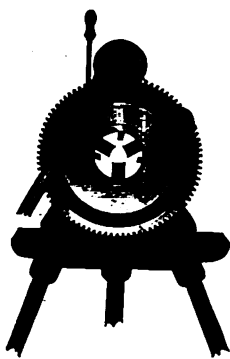
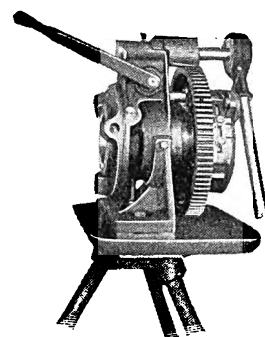
LIGHT HAND MACHINES—LEVER OR RATCHET

One set of dies threads two or more sizes of pipe. To change dies simply move the setting plate to the left as far as it will go. The dies can then be inserted or removed through the die-head without removing any part of the machine.

These are portable pipe tools which can be used as a Die-Stock; as a Bench tool; or complete with Tripod Stand. Each tool is strictly a one-man outfit.

These tools have no leading screw; the dies are started with a lever handle. One movement of the lever brings the head to position for the next cut without backing over the finished threads. No pipe vise required.

	No. 16	No. 17
Threads, pipe.....inches	$2\frac{1}{2}$ to 4	$2\frac{1}{2}$ to 6
Price with bench bracket.....each	\$110.00	\$185.00
Price with tripod, complete....."	125.00	200.00
Price dies per set of four pieces.....	9.00	11.00
Shipping weight complete with tripod....	310 lbs.	550 lbs.

FROM THE FRONT
FIG. 250FROM THE SIDE
FIG. 251

THREADING DIES

FOR HAND AND POWER MACHINES



FIG. 252

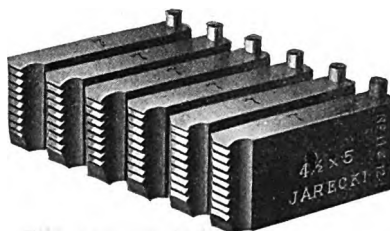


FIG. 253



FIG. 254

We can furnish threading dies for all makes of hand and power pipe, casing and tubing threading machines and all makes of bolt threading machines. When ordering be sure to state the make and style of machine for which the dies are ordered. Unless otherwise specified right hand dies with standard thread will be furnished. We are, however, in position to furnish dies with special thread or left hand dies upon receipt of complete information.

VULCAN INTERNAL AND EXTERNAL CALIPER GAUGES

UNFINISHED



FIG. 5059

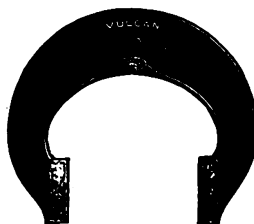


FIG. 5060

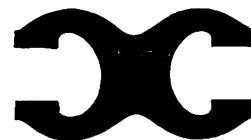


FIG. 5061

These are drop-forged from either mild steel, suitable for case-hardening, or Crucible Tool Steel. We will supply directions for hardening, or will case-harden to order, but we cannot undertake machining.

The lettering-panels and sides of jaws are on same plane and may be finished by a single grinding or polishing operation.

Small bosses at ends of Internal Gauges provide ready means of centering for lathe turning.

The special size of the measuring-jaw or pad provides for unusual advantages.

Internal Gauge, Double End, Fig. 5059: Four classes of gauges may be made from one forging:

- 1—Plain Gauge; same dimension both ends.
- 2—Gauge with one end of exact dimension, other end for two limits allowed.
- 3—Gauge with any two dimensions within range of table limits.
- 4—Gauge of the "go in" and "not go in" variety; two combinations.

External Gauge, Single End, Fig. 5060: Three classes of gauges may be made from one forging:

- 1—Plain Gauge; single dimension.
- 2—Gauge with any two dimensions within range of table limits.
- 3—Gauge of the "go on" and "not go on" variety; one combination.

External Gauge, Double End, Fig. 5061: Five classes of gauges may be made from one forging:

- 1—Plain Gauge; same dimensions both ends.
- 2—Gauge with one end of exact dimension, other end for two limits allowed.
- 3—Gauge with any two dimensions within range of table limits.
- 4—Gauge of the "go on" and "not go on" variety; two combinations.
- 5—Plain Gauge; four dimensions.

Unless otherwise specified, Mild Steel Gauges will be furnished. Furnished unfinished only, packed half dozen in a box.

INTERNAL DOUBLE END

Number	Capacity	Extreme Dimensions		Dimensions of Measuring Pad		Length Center Pad	PRICE Unfinished	
		Length	Width	Length	Width		Mild Steel	*Crucible Tool Steel
110	1 to 1 1/4	3	1 3/8	1	1/2	5/8	\$.30	\$.60
112	1 1/4 to 1 1/2	3 1/2	1 1/2	1 1/4	1/2	5/8	.40	.80
114	1 1/2 to 1 3/4	4 1/4	1 1/2	1 1/2	1/2	3/4	.55	1.10
						1 1/8		
116	1 3/4 to 2	4 7/8	2 1/8	1 3/4	5/8	7/8	.70	1.40
118	2 to 2 1/2	5 5/8	2 5/8	1 7/8	3/4	7/8	.90	1.80
120	2 1/2 to 3	6 3/8	3 1/8	2 1/8	1/2	1	1.20	2.40

EXTERNAL SINGLE END

22	3 to 3 1/2	5 1/8	5 3/4	1 1/2	1/2	.....	\$1.00	\$2.00
24	3 1/2 to 4	5 1/2	6 1/2	1 1/2	1/2	.....	1.20	2.40
26	4 to 4 1/2	6 1/4	7 1/4	1 1/2	1/2	.....	1.45	2.90
28	4 1/2 to 5	6 1/2	7 1/2	2	1/2	.....	1.75	3.50
30	5 to 5 1/2	7 1/4	8 5/8	2 1/8	5/8	.....	2.10	4.20
32	5 1/2 to 6	7 1/2	9 1/8	2 1/2	5/8	.....	2.50	5.00
34	6 to 6 3/4	8 1/4	10	2 1/2	3/4	.....	3.25	6.50
36	6 3/4 to 7 1/2	9 1/4	11	2 3/4	3/4	.....	4.00	8.00

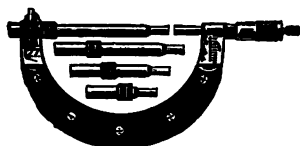
EXTERNAL DOUBLE END

2	1/4 to 3/8	2 1/8	1 1/8	1 1/8	1 1/8	.....	\$ .20	\$.40
4	3/8 to 1/2	2 1/2	1 1/8	1 1/2	1 1/8	.....	.22	.44
6	1/2 to 3/4	3 1/8	1 1/4	1 1/2	1 1/4	.....	.25	.50
8	3/4 to 1	3 5/8	1 1/2	1 1/2	1 1/2	.....	.30	.60
10	1 to 1 1/4	4 3/8	2 5/8	1 3/4	1 1/2	.....	.39	.78
12	1 1/4 to 1 1/2	5	2 3/4	1 3/4	1 1/2	.....	.53	1.06
14	1 1/2 to 1 3/4	5 1/2	3 1/4	1 3/4	1 1/2	.....	.72	1.44
16	1 3/4 to 2	6 1/4	3 1/2	1	1 1/2	.....	.96	1.92
18	2 to 2 1/2	7 1/4	4 1/4	1 1/2	1 1/2	.....	1.25	2.50
20	2 1/2 to 3	8 1/4	5 1/8	1 3/4	1 1/2	.....	1.60	3.20

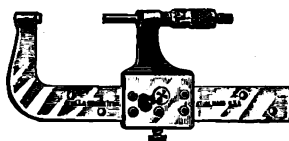
*Crucible Tool Steel Gauges are stamped "T" to indicate their grade.

STARRETT MICROMETER CALIPERS

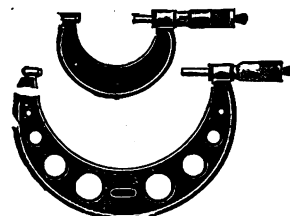
NOS. 127, 128 and 239



NO. 127 FIG. 3861



NO. 128 FIG. 3862



NO. 239 FIG. 3863

UNITED STATES GOVERNMENT MICROMETER CALIPER GAUGES

No. 127: The frames are cut from steel plates, nicely finished. The sides are covered with hard rubber, put on with brass screws, preventing inaccuracy through expansion caused by change in temperature when held in warm hands. The micrometer screw adjusts one inch, reading 1-1000 of an inch, and is provided with patent lock nut. The different length tail spindles, forming anvils, are interchangeable and have positive stops to set against their socketed seats. Furnished with ratchet stop or speeded screw thumb piece, as desired.

SIX INCH MICROMETER CALIPERS

No. 128: This caliper will measure round work to $4\frac{1}{4}$ inches, and flat work to 6 inches. It weighs 21 ounces, and is rigid and accurate. It can be quickly set to exact position, from 1 inch to 6 inches, by inserting a plug, as shown. A valuable feature of this tool is a set of six independent holes through both the movable part and the beam, each hole being bushed with hardened steel bushings, ground and lapped to fit the plug, which locates to exactness the various inch settings.

HEAVY MICROMETER CALIPERS

No. 239: Meet the exacting demands of heavy and severe usage. The bearing parts and measuring surfaces are hardened to prevent wear, and the same means provided for adjustment as in our other micrometers. Made with lock nut and ratchet stop. Sizes are stamped to show their capacity.

No.	Range, inches	Price without Standard	Price with Standard	Extra for Leather Case	No.	Range, inches	Price without Standard	Price with Standard	Extra for Leather Case
127A	0 to 4	\$38.50	.....	included	239	5 to 6	\$19.00	\$21.25	\$3.75
127B	4 to 8	56.50	.....	included		6 to 7	20.50	23.50	not furnished
127C	8 to 12	75.75	.....	included		7 to 8	22.00	25.25	not furnished
128	1 to 6	50.00	.....	\$3.00		8 to 9	23.50	27.25	not furnished
239	1 to 2	13.25	\$14.75	1.50		9 to 10	25.00	29.00	not furnished
	2 to 3	14.50	16.00	2.25		10 to 11	26.50	30.75	not furnished
	3 to 4	16.00	17.75	2.75		11 to 12	28.00	32.50	not furnished
	4 to 5	17.50	19.50	3.25					

Nos. 127 and 128 sent with case unless otherwise ordered. All sizes No. 239 sent without case and with standard unless otherwise ordered. Leather cases not supplied for No. 239 for sizes above 6 inch.

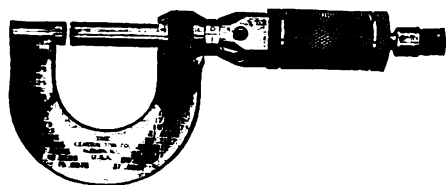


FIG. 3864

JAQUES EASY-READING MICROMETER CALIPER

Black figures appear plainly in a little window and show the measurement. Instead of the usual forty confusing lines on the barrel, there are only ten. Absence of 25th, 50th and 75th lines insures quick and accurate reading. An inexperienced micrometer user can read it as accurately and many times quicker than the skilled mechanic can his old-style standard.

SIZES AND PRICES

Style A	1 inch—1,000ths.....	\$12.50	Style N	4 inch—1,000ths with Lock Nut.....	\$13.80
Style AL	1 inch—1,000ths with Lock Nut.....	13.15	Extra for Ratchet Stop.....		.65
Style E	2 inch—1,000ths with Lock Nut.....	12.50	Extra for 10,000ths lines.....		1.30
Style J	3 inch—1,000ths with Lock Nut.....	13.15			

BROWN AND SHARPE DIRECT-READING MICROMETER CALIPER

NO. 25

Thousandths of an inch can be read in exact figures, without the necessity of calculation with the aid of graduation lines. The figures showing in the opening nearest the frame indicate the movement of the spindle by tenths of an inch. Those in the next opening register the movement by hundredths of an inch while the figures in the last opening indicate the movement by thousandths. In addition, the thimble on the end of the sleeve is graduated in connection with a line on the sleeve to read to thousandths of an inch. By means of these lines, fractional parts of a thousandth may be estimated. It is regularly furnished with a ratchet stop.

Range 0 to 1 inch by 1,000ths. Price each in Morocco Case.....\$22.00

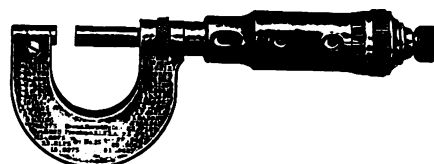


FIG. 3865

STARRETT MICROMETER CALIPERS

NO. 226

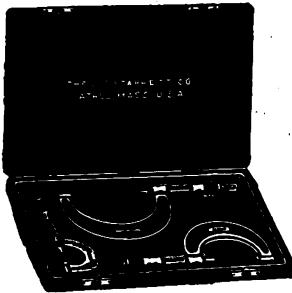


FIG. 287½

CASES FOR MICROMETER CALIPERS NO. 226

The cases for these calipers are well made and nicely finished. They are covered with morocco leather and lined with velvet.

PRICES FOR CASES ONLY

For set of three micrometers.....	\$4.00
For set of six micrometers.....	7.50

NO. 226

SETS OF, WITH OR WITHOUT CASE

The following Micrometer Caliper Sets have been selected to provide inexpensive, yet accurate, serviceable sets of calipers from 0 to 3 inches and 0 to 6 inches. They are better adapted for general use than the vernier or bar micrometer, as they can be set quickly for the different measurements and are more easily read.

Each micrometer is graduated to read by thousandths of an inch, is furnished with patent lock nut, (excepting the Yankee No. 650, 1 inch) and is sent with or without ratchet stop as desired.

The frames are drop forged from bar steel and are nicely finished.

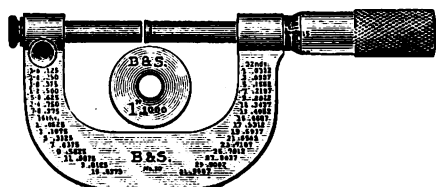
The 1 inch has the decimal equivalents stamped on the frame, (excepting the Yankee No. 650-1 inch). The other sizes are marked to show their capacity.

Standards for use in adjusting these micrometers will be furnished when desired at prices given below.

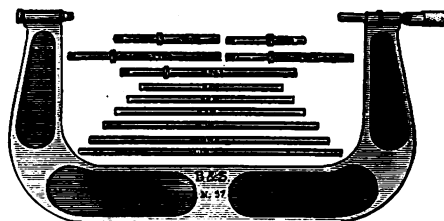
PRICES PER SET		Without Case	With Case
No. 226 A	Set of three micrometer calipers comprising the Yankee No. 650 1-inch, No. 226 2-inch, and 3-inch, all without ratchet stop.. Set of two standards for above.....\$3.00	\$26.00	\$30.00
No. 226 B	Set of three micrometer calipers comprising the Yankee No. 650 1-inch, No. 226 2-inch, and 3-inch, all with ratchet stop.... Set of two standards for above.....\$3.00	27.50	31.50
No. 226 C	Set of three micrometer calipers comprising the No. 201 1-inch, No. 226 2-inch and 3-inch, all without ratchet stop..... Set of two standards for above.....\$3.00	28.00	32.00
No. 226 D	Set of three micrometer calipers comprising the No. 3 1-inch, No. 226 2-inch, and 3-inch, all with ratchet stop..... Set of two standards for above.....\$3.00	\$29.50	\$33.50
No. 226 E	Set of six micrometer calipers comprising the Yankee No. 650 1-inch, No. 226 2-inch, 3-inch, 4-inch, 5-inch, and 6-inch, all without ratchet stop..... Set of five standards for above.....\$9.15	61.75	69.25
No. 226 F	Set of six micrometer calipers comprising the Yankee No. 650 1-inch, No. 226 2-inch, 3-inch, 4-inch, 5-inch, and 6-inch, all with ratchet stop..... Set of five standards for above.....\$9.15	64.75	72.25
No. 226 G	Set of six micrometer calipers comprising the No. 201 1-inch, No. 226 2-inch, 3-inch, 4-inch, 5-inch, and 6-inch, all without ratchet stop..... Set of five standards for above.....\$9.15	63.75	71.25
No. 226 H	Set of six micrometer calipers comprising the No. 3 1-inch, No. 226 2-inch, 3-inch, 4-inch, 5-inch, and 6-inch, all with ratchet stop..... Set of five standards for above.....\$9.15	66.75	74.25

The above sets are sent without case, and without standards, unless ordered.

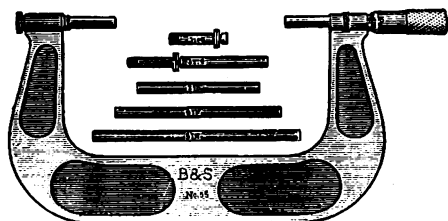
BROWN AND SHARPE MICROMETER CALIPERS



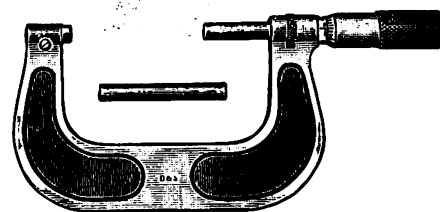
NOS. 30 AND 31 FIG. 3866



NO. 57—FIG. 3868



NO. 55 FIG. 3867



NOS. 61 TO 76—FIG. 3869

NOS. 30 AND 31

No. 30: This Caliper measures all sizes less than 2 inches by thousandths of an inch.

No. 31: This Caliper differs from No. 30 only in having a clamp screw which clamps the spindle and preserves the setting.

NO. 55

This Caliper measures all sizes from 3 inches to 6 inches by thousandths of an inch. Three anvils are furnished; the long anvil measures from 3 inches to 4 inches, the intermediate from 4 inches to 5 inches, and the short one from 5 inches to 6 inches. Each anvil is provided with separate means of adjustment for wear. They are easily and quickly inserted in the frame and are held solidly to their bearings by a knurled nut. Means of adjustment for the measuring screw are also provided. Provided with a clamp ring which clamps the spindle and preserves the setting.

NO. 57

Differs from No. 55 only in that it measures all sizes from 6 inches to 12 inches by thousandths of an inch. Six anvils are furnished and measure respectively 11 inches to 12 inches, 10 inches to 11 inches, 9 inches to 10 inches, 8 inches to 9 inches, 7 inches to 8 inches and 6 inches to 7 inches. Each anvil is provided with separate means of adjustment for wear. Provided with a clamp ring, which clamps the spindle and preserves the setting.

NOS. 61 TO 76

These Calipers are made to meet the demand for inexpensive, yet accurate measuring tools. They are more convenient for general use than the Bar Micrometer or Vernier, as they can be more readily set for the different measurements and are more easily handled where rapid measurements are required. Provided with a clamp ring which clamps the spindle and preserves the setting.

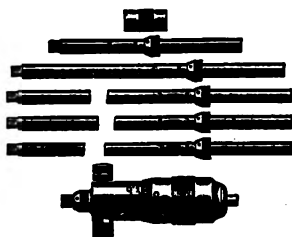
No.	Range inches	Price with Standards *	Price with Ratchet Stop and Standards	Extra for Morocco Case	No.	Range inches	Price with Standards *	Price with Ratchet Stop and Standards	Extra for Morocco Case
30	0 to 2	\$12.50	\$13.00	\$1.25	67	4 to 5	\$14.00	\$14.50	\$2.75
31	0 to 2	13.50	14.00	1.25	69	5 to 6	15.50	16.00	3.00
55	3 to 6	24.50	25.00	....	71	6 to 7	17.00	17.50	.....
57	6 to 12	54.40	54.90	....	72	7 to 8	18.60	19.10	.....
61	1 to 2	10.00	10.50	1.25	73	8 to 9	20.20	20.70	.....
63	2 to 3	11.50	12.00	1.50	74	9 to 10	21.90	22.40	.....
65	3 to 4	12.50	13.00	2.50	75	10 to 11	23.50	24.00	.....
					76	11 to 12	25.20	25.70	.....

*One Standard each furnished with all numbers with exception of Nos. 55 and 57. With No. 55 three standards are furnished and with No. 57 six standards are furnished unless otherwise ordered.

All of the above calipers can also be furnished for Metric Measure.

STARRETT INSIDE MICROMETER CALIPERS

NO. 124



SET A
FIG. 291

PRICES NO. 124

- Set A has 6 rods and one $\frac{1}{2}$ -inch gauge, and measures from 2 inches to 8 inches, with case \$8.50, without case.....\$7.25
- Set B has 10 rods and one $\frac{1}{2}$ -inch gauge, and measures from 2 inches to 12 inches, with case \$10.00, without case..... 8.50
- Set C has 4 rods and one 1-inch and two 2-inch gauges, and measures from 8 inches to 32 inches, with case \$12.75, without case.....10.25
- Set D comprises sets A and C, and measures from 2 inches to 32 inches, with case \$20.50, without case.....17.50
- Handle extra..... 1.00
- Sent with case, unless otherwise ordered.

This cut shows the No. 124 new inside micrometer caliper, which is designed for internal and linear measurements, such as measuring cylinders, rings; also for setting calipers, comparing gauges, etc. It is also useful in measuring parallel surfaces. The micrometer screw in the head has $\frac{1}{2}$ inch movement in Sets A and B, one inch in Set C, and, by means of the extension rods furnished, the sizes as given below for each set can be obtained. The extension rods are provided with a collar, against which the rods are conveniently and accurately set in the micrometer head. In setting these rods see that the zero mark on the collar coincides with the zero mark on the micrometer head. With the rods are sent standard gauges or rings to slip on the rods under the collars, to further extend the rod. The contact surfaces are all hardened and provision is made for adjustment, to compensate for wear of the screw and contact surfaces.

AUXILIARY HANDLES

The auxiliary handle, as shown in cut, can be used with sets A, B and D. The handle is used by removing the nut opposite the lock nut and screwing the handle in place of same, thus fitting the tool in places too small for the hand.

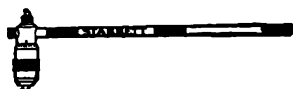


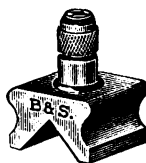
FIG. 291½

BROWN AND SHARPE INSIDE MICROMETER CALIPERS

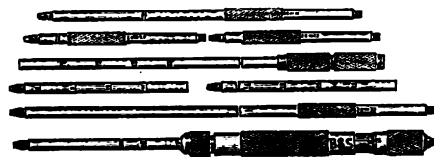
NOS. 260, 261 AND 262



NOS. 260 AND 261 FIG. 3870



NO. 598 FIG. 3871



NO. 262 FIG. 3872

NOS. 260 AND 261

NO. 262

This Micrometer consists of a holder with a micrometer screw and thimble graduated to read to .001". The extension rods are graduated by a series of angular grooves of a form and depth that allow the clamping fingers to spring in and the adjustments quickly and positively made.

Metric Measure. This Micrometer is also made to read to hundredths of a millimetre.

These Gauges consist of a holder with a micrometer screw and thimble graduated to .001". The extension rods are graduated by a series of angular grooves of a form and depth that allow the clamping fingers to spring in and the adjustments quickly and positively made.

Metric Measure. These Gauges are also made to read to hundredths of a millimetre.

HEIGHT GAUGE ATTACHMENT NO. 598

FOR USE WITH INSIDE MICROMETERS NOS. 260 AND 261

This base is designed for use in connection with the inside micrometer thus making a reliable height gauge. The measuring rod is inserted upwards through the underside of the face and the clamping fingers; and by turning the knurled nut, the rod is held firmly in an upright position. The micrometer is then adjusted and clamped to the upper end of the rod. The base has a V-shaped groove in the bottom which adapts the tool for use in cylindrical work.

No.	No. of Rods	Range, inches	Price with case	Price without case
260	5	2 to 9½	\$10.25	\$ 9.00
261	7	2 to 12½	12.00	10.00
262	8	8 to 36	15.50	13.00
598				2.25

STARRETT CALIPERS



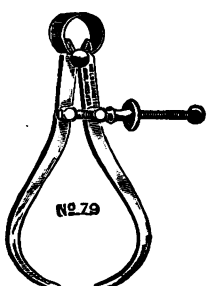
No. 41

FIG. 271



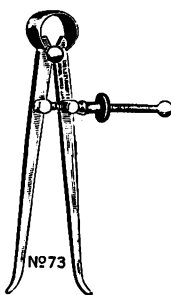
No. 42

FIG. 272



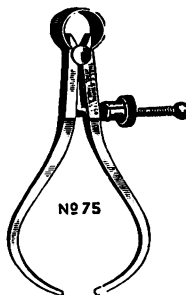
No. 79

FIG. 273



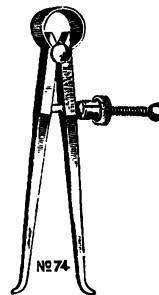
No. 73

FIG. 274



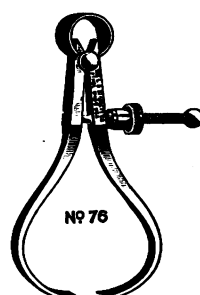
No. 75

FIG. 276



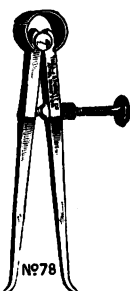
No. 74

FIG. 276



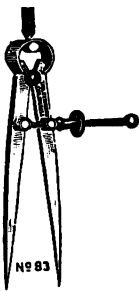
No. 76

FIG. 277



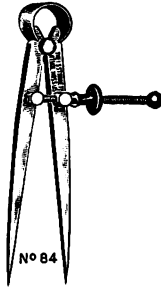
No. 78

FIG. 278



No. 83

FIG. 279



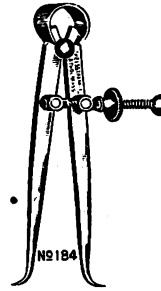
No. 84

FIG. 280



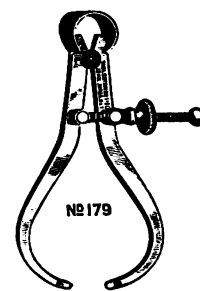
FIG. 282

SPRING NUT



No. 184

FIG. 269



No. 179

FIG. 270

No. 41: These calipers have adjustable point, as well as the improved firm-joint, which has made the No. 26 Outside and No. 27 Inside Calipers deservedly popular among mechanics. This joint, with its smooth and uniform friction, is incomparably superior to the old style riveted joint.

No. 42: Has adjustable point, lock-joint and sensitive adjustment.

Nos. 73 and 79: The Yankee Calipers are manufactured under the Fay patent, are not quite so heavy as the Fay and cost less. All sizes are supplied with either solid or quick adjusting nut.

No. 73 represents a new Yankee Inside Transfer Caliper with either spring or solid nut. The bow is stiff, making the caliper reliable. After caliperizing inside of chambered cavity by springing in the legs they may be withdrawn, and as they spring back will show the exact size caliperized.

Nos. 74 and 75: Show the Fay Outside and Inside Calipers.

Nos. 76 and 78: Show the Fay thread and Inside Calipers. No. 184: These calipers are designed for measuring the diameter at bottom of threads.

No. 179: These calipers are designed for measuring the diameter at bottom of threads on the outside of screws.

PRICE EACH

No.	Size Inches							
	2½	3	4	5	6	8	10	12
41	....	....	\$ .80	....	\$1.00	\$1.20	\$1.45	....
42	....	....	1.20	....	1.40	1.65	1.95	....
73 or 79 Solid Nut	\$.80	\$.85	.90	\$1.00	1.05	1.20	1.65	\$1.80
73 or 79 Spring Nut	1.00	1.05	1.10	1.15	1.20	1.40	1.80	2.00
74 Inside, Solid Nut	1.20	1.20	1.35	1.35	1.65	1.95	....	....
74 " Spring Nut	1.40	1.40	1.50	1.50	1.80	2.10	....	....
75 Outside, Solid Nut	1.20	1.20	1.35	1.35	1.65	1.95	....	....
75 " Spring Nut	1.40	1.40	1.50	1.50	1.80	2.10	....	....
76 Thread Solid Nut	....	1.20	1.35	1.35	....	....	....	....
76 " Spring Nut	....	1.40	1.50	1.50	....	....	....	....
78 Inside Solid Nut	....	....	1.35	1.35	....	....	....	....
83 or 84, Solid Nut	.80	.85	.90	1.00	1.05	1.35	1.65	1.80
83 or 84, Spring Nut	1.00	1.00	1.10	1.15	1.20	1.50	1.80	2.00
179 Solid Nut	....	....	.90	1.00	1.05	....	....	....
179 Spring Nut	....	....	1.10	1.15	1.20	....	....	....
184 Solid Nut	....	....	.90	1.00	1.05	....	....	....
184 Spring Nut	....	....	1.10	1.15	1.20	....	....	....

DUPLICATE PARTS OF FAY CALIPERS OR DIVIDERS

Screw and ball.....	\$0.20	Leg.....	\$0.40
Thumb attachment..	.20	Spring.....	.30
Solid nut.....	.15	Jam Washer.....	.15
Spring nut.....	.30	Fulcrum Stud....	.15

SPRING NUT

Fig. 282 shows the new quick-adjusting, automatic closing Spring Nut. Its use will save much valuable time in opening and closing spring-bow calipers and dividers.

STARRETT DIVIDERS AND CALIPERS

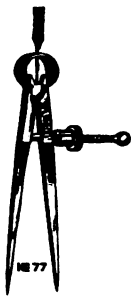


FIG. 281

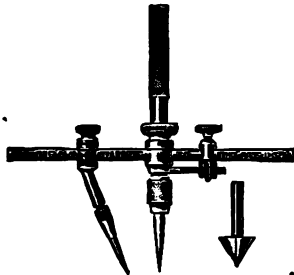


FIG. 3880

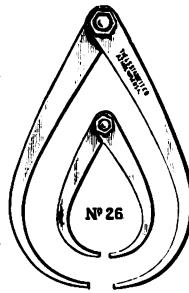


FIG. 265



FIG. 263

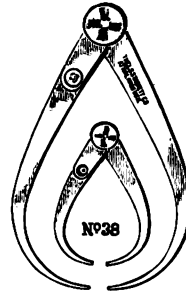


FIG. 267

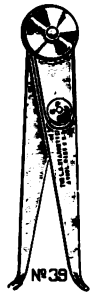


FIG. 258

DIVIDERS

No. 77: Represents the Spring Dividers with new quick-adjusting, automatic closing spring nut, a critical examination of which will at once show their superiority over all others on the market. Its use will save much valuable time in opening and closing spring-bow calipers and dividers. They are also made with a solid nut.

No. 89 Universal: The adjustable scribe holder is reversible and carries either a fine tempered steel point or a pencil lead, held in a split socket by a knurled nut. With the holder turned outward it is possible to work close to shoulders, something that cannot be done by a similar tool of any other make; turned inward, points may be brought close together to scribe the smallest circle. With 4 in. beam $7\frac{1}{2}$ in. and under may be scribed. An auxiliary beam 13 in. long is furnished, with which a 25 in. circle may be drawn. The V center point may be substituted for the regular point, adapting the tool for scribing around a drilled hole. We also furnish a pen attachment.

CALIPERS

Nos. 26 and 27: The No. 27 inside calipers are not made larger than 24 inches. The sizes given in table below refer to the length of the calipers. Their capacity is about one-third greater than the size given; for example, the 30 inch size will caliper 38 inch, and the 36 inch size will caliper 46 inch diameter.

The improvement in the Nos. 26 and 27 calipers consists in the construction of the joint, which is so made as to be drawn together by means of a screw. The main stud is squared and fitted to one leg, thus preventing the stud from turning when loosening and tightening, and insuring a smooth and uniform friction of more or less tension to suit the user.

The quality of these calipers is incomparably superior to that of any old style riveted-joint caliper on the market.

Nos. 38 and 39 are simple, light, low-priced and reliable calipers of wide scope, for both inside and outside work, that can be instantly adjusted to their full extent, and as quickly locked firm in the joint, and yet provided with a sensitive adjustment. The improvement consists, first, in a socket joint made tapering and locked or released by a partial turn of the knurled disc, drawing it together. A spring washer under the disc maintains an easy friction in the joint when unlocked.

To further describe, in the under side of short arm is a slot containing a stiff spring. Riveted into the middle leg and projecting through an opening in the arm is a threaded stud on which is a knurled nut having a beveled hub,—this bears against a cone in the arm,—the action of the spring holding them together turns the nut, presses them apart and adjusts the leg when the joint is locked. The spring taking up all back-lash, the legs are firm.

PRICE EACH

No.	Size Inches													
	2½	3	4	5	6	8	10	12	14	16	18	20	24	30
77 Solid Nut	\$1.20	\$1.20	\$1.50	\$1.50	\$1.95	\$2.25	.....	.....	.....	.....	.....	.....	.....	No. 26 only
77 Spring Nut	1.40	1.40	1.70	1.70	2.10	2.40	.....	.....	.....	.....	.....	.....	.....	No. 26 only
26 & 27	...	.50	.60	.70	.80	1.00	\$1.10	\$1.20	\$1.80	\$2.10	\$2.55	\$3.00	\$3.60	\$6.00
38 & 39	...	...	1.10	1.15	1.20	1.50	1.80	2.10	2.40	2.70	3.00	3.30	4.20	\$7.20

No. 89 Tool with 4 in. beam and V center point, as shown above.....\$2.40*

EXTRAS

Extra Steel Points, each.....\$0.15
Needle Points, each......20
Pen Attachment..... 1.80

Extra Straight Point and socket.....\$0.60
Extra 13 in. beam to scribe 25 in. circle......30
Coupling......45

Total for tool and all attachments..... \$5.90

*Tool and V Center Point, listing at \$2.40, sent unless otherwise ordered.

STARRETT TOOL MAKERS' CALIPERS AND DIVIDERS

The cuts on this page represent a new line of Calipers and Dividers made from round stock with legs drawn down, making them hard and stiff. The fulcrum stud is hardened, bows extra strong, screw and nut nicely fitted, all finely finished and are the best tools in their line. They are made with solid nut only.

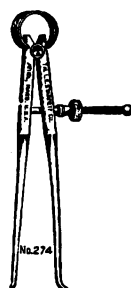


FIG. 5062

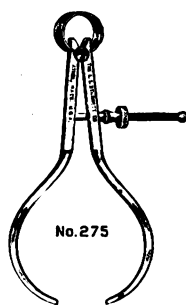


FIG. 5063

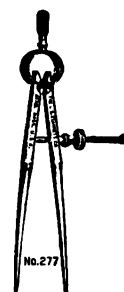


FIG. 5064

PRICE EACH

No.	Size Inches					Duplicate Parts					
	2	3	4	5	6						
274	\$1.20	\$1.50	\$1.80	\$1.80	\$2.10	Screw and Ball....	\$	.20	Fulcrum Stud....	\$	.15
275	1.20	1.50	1.80	1.80	2.10	Thumb Attach....		.20	Leg.....		.40
277	1.20	1.50	1.80	1.80	2.10	Nut.....		.15	Jam Washer....		.15
						Spring.....		.30			

STARRETT SCRIBERS

IMPROVED—NO. 67

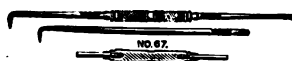


FIG. 293

This scriber is made for mechanics who want a better one than has been heretofore obtainable. These points are made of a fine grade of steel, nicely tempered. The knurled stock is of sufficient size to be easily held without cramping or turning in the fingers. The long, bent point will be found a valuable auxiliary for reaching through holes, etc. Length, with short, bent point, 9 inches; with long point, 12 inches. All parts are interchangeable. The knurled sleeve is nickeled.

PRICES

Complete.....	\$0.60
Without long point.....	.45
Straight point or short bent point, each.....	.15
Long bent point, each.....	.20

The tool will be sent complete unless otherwise ordered.

POCKET—NO. 70



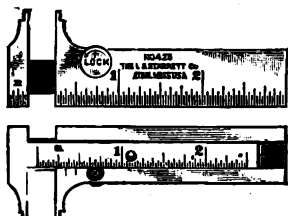
FIG. 292

This tool is made from steel tubing, knurled and nickel plated. The scriber is made from the best quality of steel, nicely tempered, and is held by a knurled chuck.

The scriber is reversible, telescoping into the stock, and is held by a slight turn of the chuck so that it is always as safe to carry in the pocket as a penknife.

PRICES

No. 70 A	Handle $\frac{1}{4}$ in. diam., blade $2\frac{3}{8}$ in. long, weight, 1 oz.....	\$0.30
No. 70 B	Handle $\frac{3}{8}$ in. diam., blade $2\frac{3}{8}$ in. long, weight $1\frac{1}{2}$ oz.....	.45

STARRETT POCKET SLIDE CALIPERS**NOS. 425 AND 425A****FIG. 290**

No. 425 is graduated in 32ds and 64ths. The improved clamping device is a valuable feature.

No. 425A is graduated in 32ds on the stock and 100ths on the slide.

PRICES NOS. 425 AND 425A

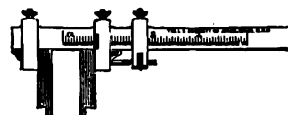
3 inch.....	\$4.00
5 "	5.00

STARRETT CALIPER SQUARES**NO. 25**

For both outside and inside measure. The beam is graduated in 64ths on one side and 100ths on the other.

PRICES

A	3 inch, with adjusting screw.....	\$ 8.00	D	without.....	\$ 7.00
B	4 " " " "	10.20	E	"	9.00
C	6 " " " "	12.00	F	"	10.00
With hardened jaws, extra.....					1.80
In leather case, extra.....					1.20
Sent with adjusting screw and without case unless otherwise ordered.					

**FIG. NO. 3873****BROWN AND SHARPE VERNIER CALIPERS****NO. 570**

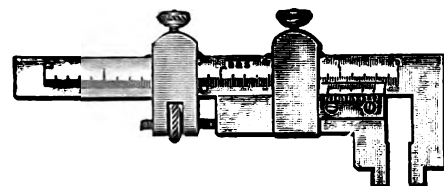
These Vernier Calipers take inside as well as outside measurements. The jaws are hardened and ground. Points are placed on the bars and slides so that dividers can be set to transfer distances.

Vernier Calipers are furnished in cases unless otherwise ordered.

An explanation of the Vernier is sent with each Caliper.

A 1/4" Standard Internal Cylindrical Gauge is furnished at extra price when desired for testing the accuracy of the adjustment of the Caliper.

These Vernier Calipers are graduated on the front to read, by means of a Vernier, to thousandths of an inch. They are graduated on the back to 64ths of an inch.

**FIG. NO. 3874**

No.	Size	Length of Jaws	Width of Jaws closed	Price	Price Case Extra
570	6"	1 1/4"	1/4"	\$24.00	\$1.50
	12	2 1/4	3/10	30.00	2.75
	24	2 1/4	3/10	42.00	4.50
	36	2 3/4	5/10	72.00	

Standard Cylindrical Gauge \$3.00.

All are furnished in cases, unless otherwise ordered.

STARRETT STANDARD END MEASURING RODS

NO. 234

These rods are made of steel, hardened and lapped spherical on the ends with a radius of one-half the length of the rod. The handles are of rubber, two-thirds the length of the rod, and guard against any expansion due to change in temperature when held in the hands, thereby maintaining their accuracy under adverse conditions. The one inch and 25 mm. are in the form of a round disc, as shown in cut.

2 inch to 6 inch are $\frac{1}{4}$ inch diameter with handles $\frac{1}{8}$ inch diameter.

6 inch to 12 inch are $\frac{3}{8}$ inch diameter with handles $\frac{5}{8}$ inch diameter.

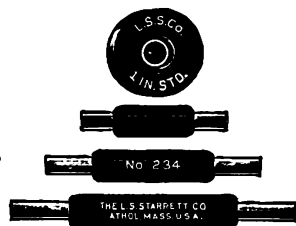


FIG. 294

PRICES

1 inch Disc ...	\$1.50	4 inch.....	\$2.40	7 inch.....	\$3.30	10 inch.....	\$4.20
2 " Rod....	1.95	5 "	2.70	8 "	3.60	11 "	4.50
3 "	2.10	6 "	3.00	9 "	3.90	12 "	4.80

STARRETT TELESCOPING INSIDE GAUGES

NO. 229

These are instruments from which the exact size of holes or slots can be taken by an outside caliper or micrometer, so that shrink, close or loose fits, varying in thousandths, or less, can be made and measured.

The ends of each telescope head are hardened and are made on a radius of the smallest hole it will enter. These instruments are more reliable than ordinary leg calipers on account of the tendency of the legs of the latter to spring and of the points to catch in blow holes or other depressions. They can be used, of course, either in fitting cylinders to holes or holes to cylinders.

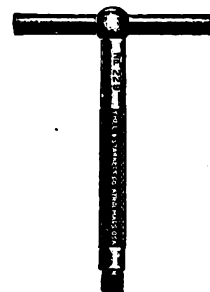


FIG. 3875

No.	Range	PRICES	
		1/2 inch to 3/4 inch.....	each, \$
No. 229A	1/2 inch to 3/4 inch	.....	1.80
No. 229B	3/4 " " 1 1/4 "	.....	2.10
No. 229C	1 1/4 " " 2 1/8 "	.....	2.40
No. 229D	2 1/8 " " 3 1/2 "	.....	3.00
No. 229E	3 1/2 " " 6 "	.....	3.60

The gauges are made in sizes to enter holes from $\frac{1}{2}$ inch to 6 inches.

STARRETT UNIVERSAL TEST INDICATOR

NO. 64

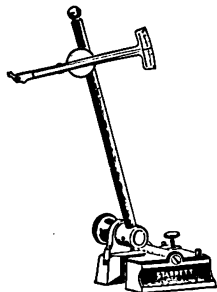


FIG. 296

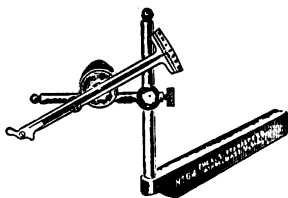


FIG. 295

This indicator may be used to test inside, outside or surface work. It can be instantly attached to the spindle or the needle of any surface gauge, and used to show the slightest variation in thousandths. It may be clamped to a flat or round support, up to $\frac{3}{8}$ inch flat or round. A special holder, as shown in cut, is designed to go in the tool-post of a lathe, adapting it for use to show the accuracy of all sorts of lathe work, turning,

chucking, or locating and centering work on face plate. The head of the needle has three working points, equally distant from its fulcrum, so that telltale needle will vibrate, reading in thousandths, when work is in contact with either point—in front, above or below it. When in front, the spring operating the telltale needle needs to be reversed to throw point of needle up instead of down as when used above or below the work. This may be instantly done by a slight turn of the disc to which the vibrating spring is attached. The working parts of the head are hardened. In setting the indicator, bring the contact point against the work so that the needle will point to 0, when any variation either way will show.

Prices

Indicator only.....	\$3.00
Tool-Post Holder, without arm.....	.90
" " " with arm.....	1.20
Indicator, with Tool-Post Holder and arm, complete...	4.20

Sent complete unless otherwise ordered.

STARRETT UNIVERSAL GAUGES

NOS. 57 AND 257

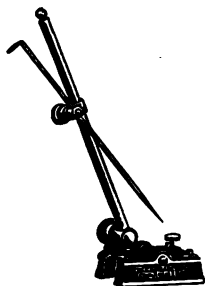


FIG. 298

Heavy base, grooved through the bottom and end, adapting it for use on or against circular work as well as flat surfaces.

No. 257 has case hardened steel base.

The spindle passes through a rotating head, jointed to a rocking bracket, pivoted in base. The bracket being adjusted

by a knurled screw in one end against a stiff spring in the other, the spindle may be set upright or at any angle, or turned so as to work under the base and be sensitively adjusted to any position. The snug and head carrying the scriber are so made that when the clamp nut is loosened, all may be freely moved to any position and by friction springs retained in place until a slight turn of the clamp nut holds them firm.

In the rear end of the base of No. 57 are two gauge pins and No. 257 four gauge pins frictionally held which may be pushed down to bear against the edge of a surface plate or in the slot of a planer bed for linear work.

For small work the spindle may be removed and the scriber inserted in hole provided where it can be sensitively adjusted and used to advantage on bench work.

Length given for spindle includes height of spindle and base; except the 12-inch spindle with 57B and 257B and the 18-inch with 57D and 257D, the depth of the base not being included in the length of these two spindles.

Nos.	57A	257A	57B	257B	57C	257C	57D	257D
Base, inches	3	3	3	3	3 $\frac{3}{4}$	3 $\frac{1}{2}$	3 $\frac{3}{4}$	3 $\frac{1}{2}$
Spindles, inches	9	9	9 & 12	9 & 12	12	12	12 & 18	12 & 18
Price, each	\$3.50	\$4.75	\$4.00	\$5.15	\$4.15	\$5.30	\$4.75	\$6.00

BROWN AND SHARPE UNIVERSAL SURFACE GAUGES

NOS. 620, 621 AND 622

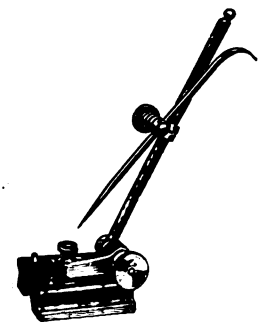


FIG. 3876

A wide range of adjustments can be quickly obtained by means of the knurled adjusting screw. All moving parts can be firmly clamped in position when the desired setting has been obtained. The spindle passes through a bushing and bolt which are clamped by a knurled nut firmly to the boss on the base thereby removing any possibility of play in the working parts when the spindle has been clamped in position. The base is of a form most convenient to handle. A V-shaped groove in the bottom especially adapts it for cylindrical work. It has two gauge pins in the rear end that can be pushed down and used against the edge of a plate or the side of a T slot. The spindle swivels can be securely clamped in any position from the vertical to the horizontal, and the scriber may be used below the base as a depth gauge. For small work the spindle may be removed and the scriber inserted in a hole in the spindle swivelling bolt, where it is readily adjusted.

Nos.	620	621	621	622 Heavy Base	622 Heavy Base
Base, inches	2 $\frac{1}{4}$ x1 $\frac{1}{2}$	3 $\frac{1}{8}$ x2 $\frac{1}{2}$	3 $\frac{1}{8}$ x2 $\frac{1}{2}$	4x3 $\frac{3}{8}$	4x3 $\frac{3}{8}$
Spindle, inches	4	9	9 & 12	12	12 & 18
Price each base not hardened	\$3.50	\$3.50	\$4.00	\$4.15	\$4.75
Price each base hardened	4.10	4.75	5.15	5.30	6.00

STARRETT STEEL STRAIGHT EDGES

NO. 382

Length	Width	Approximate Thickness	Price Each
1 $\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	\$0.50
2 $\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	.55
2 $\frac{3}{8}$	$\frac{5}{8}$	$\frac{1}{8}$	.60
3 $\frac{1}{8}$	$\frac{7}{8}$	$\frac{1}{8}$	.75
5 $\frac{1}{8}$	1 $\frac{1}{8}$	$\frac{1}{8}$	1.20
7 $\frac{1}{8}$	1 $\frac{1}{8}$	$\frac{1}{8}$	1.50
10 $\frac{1}{8}$	1 $\frac{1}{8}$	$\frac{1}{8}$	2.40
13 $\frac{1}{8}$	2	$\frac{1}{8}$	3.30
17	2 $\frac{1}{4}$	$\frac{1}{8}$	4.20
20 $\frac{3}{8}$	2 $\frac{3}{8}$	$\frac{1}{8}$	5.40
26 $\frac{3}{8}$	3 $\frac{1}{8}$	$\frac{1}{8}$	7.80



FIG. 320

These straight edges are accurately ground and hardened on the edges and are guaranteed to be correct.

STARRETT GRADUATED STEEL STRAIGHT EDGES

NO. 383 NOT BEVELED

Graduated on one side only, one edge in 16ths and the other in 8ths of an inch.



FIG. 323

12 in. long, 1 in. wide, $\frac{3}{16}$ in. thick	\$ 2.50
18 " " $1\frac{1}{4}$ " " $\frac{1}{8}$ " "	3.40
24 " " $1\frac{1}{2}$ " " $\frac{1}{8}$ " "	4.30
36 " " 2 " " $\frac{1}{4}$ " "	7.50
48 " " $2\frac{1}{2}$ " " $\frac{1}{4}$ " "	12.00

NO. 387 BEVELED

Graduated on beveled edge only in 32ds of an inch.



FIG. 324

12 in. long, 1 in. wide, $\frac{3}{16}$ in. thick	\$3.00
18 " " $1\frac{1}{4}$ " " $\frac{1}{8}$ " "	4.20
24 " " $1\frac{1}{2}$ " " $\frac{1}{8}$ " "	5.50
36 " " 2 " " $\frac{1}{4}$ " "	8.70
48 " " $2\frac{1}{2}$ " " $\frac{1}{4}$ " "	14.40

CAST IRON STRAIGHT EDGES



FIG. 3877

These Straight Edges are of a form best adapted to retain a straight line.

The edge of each is scraped to form a true surface, and the straight edges when thus made are indispensable in the proper scraping of the ways of planer and lathe beds, etc.

Size	Weight	Price
18" x $1\frac{1}{2}$ "	5 lbs.	\$14.00
24" x $1\frac{1}{2}$ "	10	18.00
30" x $1\frac{1}{2}$ "	15	22.00
36" x $1\frac{1}{2}$ "	15	25.00
48" x 2"	35	30.00
60" x $2\frac{1}{8}$ "	50	39.00
72" x $2\frac{1}{4}$ "	75	48.00
84" x $2\frac{3}{8}$ "	120	58.00
96" x $2\frac{3}{8}$ "	145	70.00
120" x $2\frac{3}{4}$ "	300	90.00
*144" x 3"	420	.....
*180" x $3\frac{1}{2}$ "	835	.....

Price includes cover. *Made to order only.

STANDARD CAST IRON SURFACE PLATES

Size	Weight about	Price Each	Size	Weight about	Price Each
$3\frac{1}{2}$ " x 4 "	2lbs.	\$ 4.25	12" x 18"	58lbs.	\$ 37.50
$3\frac{1}{2}$ " x 12 "	10	10.00	12" x 24"	92	52.00
4 " x 7 "	6	8.00	12" x 36"	158	75.00
4 " x 15 "	17	13.50	*12" x 144"	2000	292.00
4 " x 18 "	18	14.50	*12" x 65"	390	139.00
*4 " x 40 "	80	27.50	14" x 14"	52	32.00
$4\frac{1}{2}$ " x 6 "	5	7.75	14" x 18"	58	42.00
5 " x 16 "	18	15.50	14" x 21"	78	52.00
6 " x 6 "	6	9.50	15" x 30"	160	79.00
6 " x 12 "	15	14.50	16" x 16"	66	42.00
6 " x 26 "	46	25.50	16" x 48"	355	145.00
6 " x 50 "	105	54.00	18" x 18"	90	54.00
*6 " x 72 "	280	75.00	18" x 24"	120	73.00
$6\frac{1}{2}$ " x 18 "	30	22.00	18" x 36"	180	96.00
7 " x $7\frac{1}{2}$ "	10	12.00	20" x 30"	200	105.00
7 " x 10 "	15	14.50	24" x 24"	205	99.00
8 " x 12 "	19	16.50	24" x 36"	285	152.00
9 " x 9 "	16	15.50	24" x 48"	485	204.00
9 " x 14 "	29	20.50	24" x 60"	696	264.00
10 " x 15 "	39	25.00	30" x 36"	375	190.00
10 " x 30 "	86	53.00	30" x 60"	800	328.00
10 " x 50 "	190	87.00	36" x 68"	1355	464.00
12 " x 12 "	30	23.50			

*Made to order only.

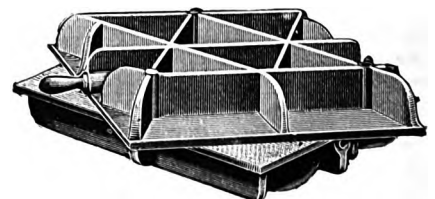


FIG. 3878

These plates are usually sold singly, not in pairs, as shown in cut. Unless otherwise specified, price is quoted for single plate with cover.

STARRETT SCREW PITCH GAUGES

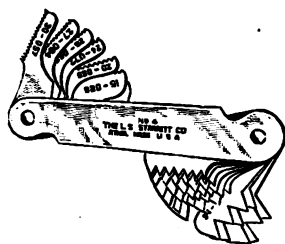


FIG. 303

IMPROVED NO. 40

22 PITCHES, 9 TO 40

If not known the pitch of a thread may be readily determined by comparison with the standards given on this improved screw pitch gauge. On the edge of the thin leaves there are teeth corresponding to standard thread sections and by placing leaves successively over the thread some one leaf will coincide when the pitch of the thread can be read from the stamping on the leaf

The free end of the leaf is made narrow, permitting it to be inserted in a small nut so that either outside or inside threads may be compared.

A late improvement in this screw pitch gauge is the stamping on each leaf of decimals showing the double depth of thread which, of course, equals the depth of threads on the two sides of a tap having the same pitch. This enables the workman to determine what size of drill must be used to leave a full V-thread for a tap having the same pitch. To do this, caliper with a micrometer over the threads of the tap and from its size in thousandths shown, deduct those decimals given on the pitch gauge leaf which agree with the pitch of the tap. The result will show in thousandths the size of drill needed for a full thread. Allowance is to be made for the amount the thread is to be flattened.

The gauge has 22 pitches, viz: 9, 10, 11, 11½, 12, 13, 14, 15, 16, 18, 20, 22, 24, 26, 27, 28, 30, 32, 34, 36, 38, 40.

Price, each..... \$1.25

Formula for depth of threads for a V thread:

$$d = D - \frac{1.733}{N}$$

Formula for U. S. Standard:

$$d = D - \frac{1.299}{N}$$

D=Outside diameter of tap.

d=Bottom " " "

N=Number of threads per inch.

NO. 4

24 PITCHES, 4 TO 30

Has the following pitches: 4, 4½, 5, 5½, 6, 7, 8, 9, 10, 11, 11½, 12, 13, 14, 15, 16, 18, 20, 22, 24, 26, 27, 28, 30. The teeth are sharp and clean cut. Like the No. 40 it can be used inside of a nut as well as on outside of a screw or bolt. It is also a convenient and reliable tool to use as a 60-degree center gauge and gauge to test the grinding of either an inside or outside threading tool.

Price..... \$1.50

NO. 5

26 PITCHES, 32 TO 82

Of the same form as the No. 40 Screw Pitch Gauge, for inside and outside work. Has the following pitches: 32, 34, 36, 38, 40, 42, 44, 46, 48, 50, 52, 54, 56, 58, 60, 62, 64, 66, 68, 70, 72, 74, 76, 78, 80, 82.

Price..... \$1.50

NO. 6

30 PITCHES, 4 TO 42

Of the same form as the No. 4 Screw Pitch Gauge. Has the following pitches: 4, 4½, 5, 5½, 6, 7, 8, 9, 10, 11, 11½, 12, 13, 14, 15, 16, 18, 20, 22, 24, 26, 27, 28, 30, 32, 34, 36, 38, 40, 42.

Price..... \$1.75

U. S. STANDARD NO. 155

25 PITCHES, 2¼ TO 28

This gauge has 25 pitches, viz.: 2¼, 2⅜, 2½, 2⅝, 2¾, 2⅞, 3, 3¼, 3½, 4, 4½, 5, 5½, 6, 7, 8, 9, 10, 11, 12, 13, 14, 16, 18, 20.

Also center gauge with coarse and fine notch.

Price..... \$2.00

POSITIVE STOP THREAD GAUGE NO. 473

30 PITCHES 6 TO 60, V THREAD

This gauge has a positive stop which holds the blade in a fixed and convenient position for use.

It has 30 pitches from 6 to 60 inclusive as follows:

6, 7, 8, 9, 10, 11, 11½, 12, 13, 14, 15, 16, 18, 20, 22 in one end of the Case;

24, 26, 27, 28, 30, 32, 34, 36, 38, 40, 42, 48, 50, 56, 60 in the other.

The number of pitch is stamped on the right side of each blade.

Price..... \$1.80

STARRETT DEPTH GAUGE

No. 46

Has a 4-inch or 6-inch scale, $\frac{1}{16}$ inch wide, graduated in either 32ds and 64ths, 50ths and 100ths, or 64ths and 100ths, indicating exact measurements, and may be used separately from the gauge.

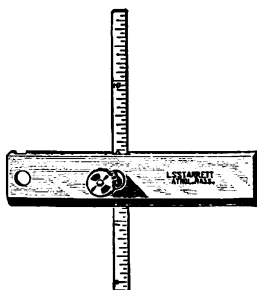


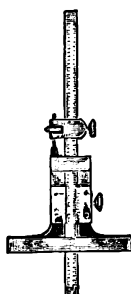
FIG. 299

PRICES

No. 46 A with 3½ inch stock and 4 inch scale.....	\$1.50
No. 46 B with 3½ inch stock and 6 inch scale.....	1.80
No. 46 C with 6 inch stock and 4 inch scale.....	1.80
No. 46 D with 6 inch stock and 6 inch scale.....	2.10
No. 46 E with 10 inch stock and 6 inch scale.....	2.70

This gauge is also made in corresponding metric sizes at above prices.

BROWN AND SHARPE DEPTH GAUGES



NO. 600—FIG. 3880.

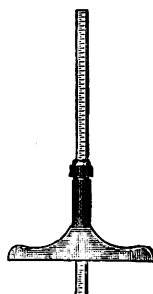
VERNIER NO. 600

This Depth Gauge is used in obtaining the depth of holes, recesses in dies, distance from a plane surface to a projection, etc. The blade is 5 inches long, $\frac{1}{4}$ -inch wide; allows of measurements to 3½ inches being made and is graduated on the front to read, by means of a vernier, to thousandths of an inch and to 64ths of an inch.

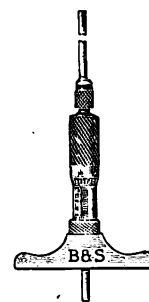
UNIVERSAL DEPTH GAUGE NO. 610

A spiral spring in the barrel forces the blade against the bottom of the hole or recess. A friction clutch, free to move under pressure of the spiral spring, holds the blade without clamping. A clamp nut at the top of the barrel clamps the blade securely in position. The blade is a narrow 6-inch tempered steel rule graduated to 64ths on one side and 100ths on the other. The blade can be swiveled completely round without disturbing the setting. Measures to 3½ inches in depth. The base is about 3 inches long, $\frac{1}{16}$ inch wide and carefully hardened and ground.

Other Blades: We furnish, when desired, blades graduated to 32nds and 64ths or 50ths and 100ths.



NO. 610—FIG. 3881



NO. 605—FIG. 3882

MICROMETER DEPTH GAUGE NO. 605

The 2 inch and 4 inch base Micrometer Depth Gauge will measure all distances to 2½ inches by .001 inch. The screw in each of these gauges has a movement of $\frac{1}{2}$ inch. The graduations are of such a form and depth that the clamping fingers, at end of gauge spring in, allowing the $\frac{1}{2}$ inch adjustments of the rod to be quickly and positively made.

The base is about $\frac{1}{16}$ inch thick and together with the point of the rod, is hardened.

The $\frac{1}{2}$ inch base gauge measures all distances to 12 inches by .001 inch.

The screw has a movement of 1 inch. The rod is graduated in inches. The graduations are of such form and depth that the clamping fingers at end of gauge spring in, allowing the 1-inch adjustments of the rod to be quickly and positively made. The base is about $\frac{1}{16}$ inch thick, and together with the point of the rod, is hardened.

This gauge is regularly furnished with a bevel point rod as shown, but can be furnished with a flat point if desired.

No.	Price Each	Price Each 2 Inch Base	Price Each 4 Inch Base	Price Each 4½ Inch Base
600	\$14.50	.....	.....	.....
605	.....	\$7.75	\$8.50	\$9.75
610	3.75	.....	.....	.....

Extra for Morocco Cases: No. 600—\$1.50; No. 605, 2 Inch Base \$1.00, 4 Inch Base \$1.25, 4½ Inch Base \$3.00.

These depth gauges can also be furnished Metric or English and Metric Measure at above prices.

STARRETT ENGINEERS' TAPER, WIRE AND THICKNESS GAUGE

NO. 245

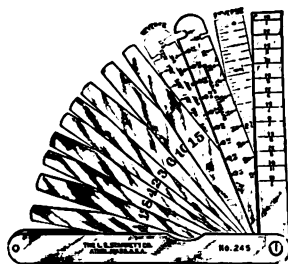


FIG. 306

This gauge is especially designed for the use of marine engineers, machinists and others desiring a set of gauges in compact form.

The taper gauge shows the thickness in 64ths to $\frac{3}{8}$ ths of an inch on one side, and on the reverse side is graduated as a rule three inches of its length, reading in 8ths, and 16ths of an inch.

The wire gauge, English Standard, shows on one side sizes numbered from 19 to 36, with two extra slots, one $\frac{1}{8}$, the other $\frac{1}{16}$ of an inch, and on the reverse side shows the decimal equivalents expressed in thousandths. This gauge has also 9 thickness or feeler gauge leaves, approximately 4 inches long, of the following thicknesses: .002, .003, .004, .006, .008, .010, .012, .015 and $\frac{1}{16}$ th of an inch, all folded within the case, which is $4\frac{3}{4}$ inches long, convenient to handle or to carry in the pocket.

Price.....each \$5.00

STARRETT THICKNESS GAUGES

NO. 172

Size A has nine leaves, viz., .0015, .002, .003, .004, .006, .008, .010, .012 and .015.

Sizes B and C have eight leaves the same as A with the omission of .0015.

The leaves are tempered and have the thickness marked upon them.

Size A is made with either straight leaves as shown, or with tapering leaves. Sent with straight leaves unless otherwise ordered.

Sizes B and C are made with tapering leaves only.

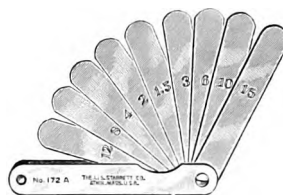


FIG. 304

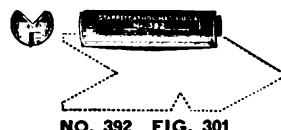
Prices

No. 172 A	Case $3\frac{3}{4}$ inches long by $\frac{1}{2}$ inch wide; leaves $3\frac{1}{4}$ inches long by $\frac{1}{2}$ inch wide...	\$1.50
No. 172 B	Case $4\frac{3}{4}$ inches long by $\frac{1}{2}$ inch wide; leaves $4\frac{1}{2}$ inches long by $\frac{1}{2}$ inch wide.....	2.50
No. 172 C	Case $6\frac{1}{4}$ inches long by $\frac{1}{2}$ inch wide; leaves 6 inches long by $\frac{1}{2}$ inch wide...	3.00

Size A will be sent unless otherwise ordered.

STARRETT CENTER GAUGES

FIG. 300



NO. 392 FIG. 301

For use in grinding and setting screw cutting tools.

PRICES

No. 390	Not tempered, graduated one corner each in 32ds, 24ths, 20ths and 14ths	\$0.35
No. 391	Spring-tempered .....	.50
No. 395	Whitworth, not tempered .....	.35
No. 396	" spring-tempered .....	.50
No. 397	Metric, not tempered .....	.35
No. 398	" spring-tempered .....	.50

The angles are 60°, except in No. 395 and No. 396, in which they are 55°.

The above attachment is a V block with a slot above the V, containing a flat spring to frictionally hold the center gauge parallel with the block. Placing the V block against a lathe spindle or face plate, a threading tool can be adjusted to line perfectly to cut both sides of a thread to the proper angle, eliminating uncertainty, for both external and internal work.

The Attachment is adapted to hold the gauges either by the side or by the end for testing work and will be greatly appreciated by all users.

Price.....\$0.60

GOODSELL CENTER GAUGE

NO. 438



FIG. 3879

60°, Graduated 1 corner each in 32ds, 24ths, 20ths and 14ths.

Price, each.....\$0.50

STARRETT TAP AND DRILL GAUGES

TIME SAVER, TAP AND DRILL
NO. 185

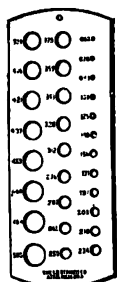


FIG. 311

JOBBERS' DRILL NO. 187

FOR GAUGING TWIST DRILLS

This gauge shows sizes from $\frac{1}{8}$ in. to $\frac{1}{2}$ in., varying by 64ths. Each size is designated by both common and decimal fractions. The gauge is hardened and tempered and the holes standard.

Price, No. 187..... \$2.75

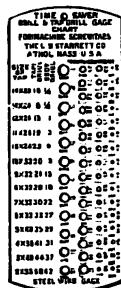


FIG. 310

By the use of this gauge one is enabled to select at once the right sized drill to suit machine screw tap most commonly used, leaving just stock enough for the tap to cut as near a full thread as is practicable for one tap without breaking it, thus saving much time and uncertainty of result attending the former crude ways of making a selection.

Explaining the chart, the first row of figures, for an example, read thus, 14 x 20 x 10 1/4. The number 14 (in the first row of figures) means the number or size of tap; 20 the pitch or size of thread; 10 the size of drill to use which will leave the right stock for proper thread; and 1/4 size of drill to use to let this tap or screw thru outside of the thread.

The figures — 1, etc., up to 60 — designate the number of drill (size agreeing with the holes). Other figures, 228, 221, etc., designate the size of hole in thousandths of an inch.

Price..... \$2.40

STARRETT HANDY EQUIVALENT TABLES



NO. 589—FIG. 312



NO. 590—FIG. 313



NO. 591—FIG. 314

MADE FROM SPRING STEEL

Ready Reference Tables that are accurate, can be carried in pocket or used around bench. Do not soil and will wear well.

Decimal Equivalents.....Price each \$.48

For Machine Screws.....Price each .48

Drill Size Tables.....Price each .48

LUFKIN STEEL SCALE

NO. 97 1/2

On one side is an assortment of United States standard machine screw tap sizes, in fractional sizes, including the S. A. E. and Briggs pipe standards. Each tap size is followed by tap size drill number. There is also a six-inch scale graduated to 32ds. On the opposite side of the scale is a complete set of decimal equivalents of fractions and a six-inch scale graduated to 64ths. Made of flexible spring steel $1\frac{1}{8}$ inch x $6\frac{3}{4}$ -inch long. This scale can be carried in the pocket or used around the bench, and bears information which is necessary daily.

Price, each..... \$0.75

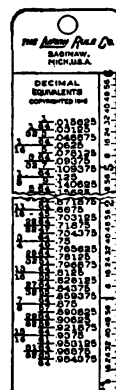


FIG. 3884

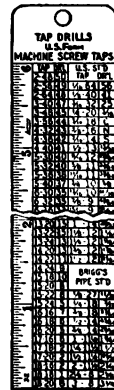


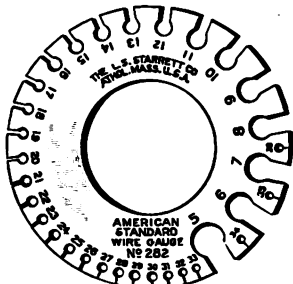
FIG. 3883

STARRETT WIRE GAUGES

AMERICAN STANDARD



NO. 281 FIG. 307



NO. 282 FIG. 308

Each gauge is tested after hardening and warranted accurate. The decimal equivalents of each number are stamped on the back.

PRICES

No. 281 takes in No. 0 to No. 36.....	\$3.00
No. 282 takes in No. 5 to No. 36.....	\$2.50

STEEL MUSIC WIRE

NO. 280

SIZES OF THE NUMBERS OF STEEL MUSIC WIRE GAUGE

No. Gauge	Size of each No. in decimal parts of an inch	No. of Gauge	Size of each No. in decimal parts of an inch
8-0	.0083	12	.0296
7-0	.0087	13	.0314
6-0	.0095	14	.0326
5-0	.010	15	.0345
4-0	.011	16	.036
3-0	.012	17	.0377
2-0	.0133	18	.0395
1-0	.0144	19	.0414
1	.0156	20	.0434
2	.0166	21	.046
3	.0178	22	.0483
4	.0188	23	.051
5	.0202	24	.055
6	.0215	25	.0586
7	.023	26	.0626
8	.0243	27	.0658
9	.0256	28	.072
10	.027	29	.076
11	.0284	30	.080

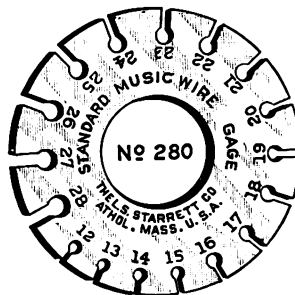


FIG. 309

Washburn & Moen standard.

Each gauge carefully tested after hardening.

PRICE

No. 280 takes in No. 12 to No. 28.....	\$1.80
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STARRETT BLACKSMITHS' RULES



FIG. 333

STEEL—NO. 460

Made of best quality spring-tempered steel. Two feet long, $\frac{1}{4}$ inch wide, 12 inch joints, 2 fold. Lock joints. Large raised figures. Graduated in 8ths of an inch on one side and 16ths on the other.

No. 460 Length, 2 foot, 2 fold, 12 inch joints....	Each	\$0.60
3 " 3 " 12 " "	"	.90

BRASS—NO. 462

Made of hard brass with stop joint. Two feet long, $\frac{1}{4}$ inch wide, 12 inch joints, 2 fold. Graduated in 8ths of an inch on one side and 16ths on the other.

Price each.....	\$0.90
-----------------	--------

STARRETT NARROW STEEL RULES



FIG. 325

About $\frac{1}{8}$ inch wide, No. 18 gauge, spring tempered, graduated one corner each side whole length, either in 32ds and 64ths, 50ths and 100ths, or 64ths and 100ths.

Lengths:.....	4 in.	6 in.	9 in.	12 in.
Prices, Each.....	\$0.60	.80	1.20	1.50
No. 330 Narrow, No. 10 graduation.	(32ds and 64ths.)			
No. 331 " No. 11 "	(64ths and 100ths.)			
No. 332 " No. 12 "	(50ths and 100ths.)			

STARRETT STEEL HOOK RULES

NARROW HOOK



FIG. 326

These rules are designed for use in taking measurements through small holes where regular hook rules cannot be used.

They can also be used for setting inside calipers, etc. Measurements through holes as small as $\frac{3}{8}$ inch can be obtained.

The rules are graduated one side in 32ds and the other in 64ths of an inch.

Lengths.....	4 in.	6 in.	9 in.	12 in.
Price Each.....	\$0.90	1.10	1.50	1.80

IMPROVED HOOK



FIG. 322

Very convenient in taking measurements from round corners, through hubs of pulleys, setting inside calipers, etc. The 6 inch may be carried in the pocket. The hook can be quickly removed by turning eccentric stud one half round.

Lengths.....	6 in.	9 in.	12 in.	18 in.	24 in.	36 in.
Price, Each	\$1.20	1.70	2.10	3.00	3.60	6.90

No. 419 $\frac{1}{4}$ inch thick, No. 4 graduation, with hook and with end graduation.

No. 420 $\frac{3}{4}$ inch thick, No. 4 graduation with hook.

No. 421 $\frac{1}{10}$ " " No. 4 " " "

No. 4 Graduations (8ths, 16ths, 32nds, 64ths).

The hooks can be applied to rules of other graduations in lengths given above when ordered. Prices same as above.

FOLDING STEEL POCKET RULES

STARRETT NO. 451

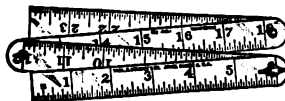


FIG. 341

Made of best quality spring-tempered steel, $\frac{3}{4}$ inch wide in 6 inch sections, with double lock joints. Accurately graduated, the same as the regular machinists' rules, in 8ths of an inch on one side and 16ths on the other, with large figures for easy reading.

Length	Price	Length	Price
3 foot 4 fold, each.....	\$1.80	4 foot 8 fold, each...	\$3.00
3 " 6 " "	2.40	6 " 12 " " ...	6.00
8 foot 16 fold, each.....	\$8.40		

LUFKIN

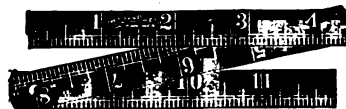


FIG. 3885

One-half inch wide. Marked one side, one edge inches and 8ths, other side one edge, inches and 16ths. Figures and graduations cut into the steel, making same show up clear and distinct. With patent stop joints that hold rule true and rigid when extended.

No.	Length	Price	With Case
4642.....	2 foot 6 inch joints, 4 fold	\$1.25	\$1.45
4643.....	3 foot 6 inch joints, 6 fold	1.85	2.10
4644.....	4 foot 6 inch joints, 8 fold	2.50	2.75

STARRETT COMBINATION SQUARE

NO. 11

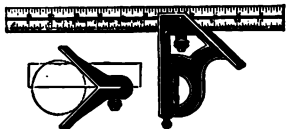


FIG. 317

Japanned iron stock, and center head, hardened blade, graduated with heavy figures reading both ways, No. 4 graduations; 8ths, 16ths, 32nds, 64ths inches.

Every tool warranted accurate. With the adjustable scale this forms one of the most convenient and useful tools ever devised for mechanics' use. It is a complete substitute for a whole set of common try squares, and is one of the best gauges made for transferring exact measurements or laying out work.

NO. 11—WITH CENTER HEAD

Length, Inches.....	6	9	12	18	24
Weight Each, Lbs.....	$\frac{1}{2}$	$\frac{3}{4}$	1	$1\frac{1}{4}$	$1\frac{3}{4}$
Each.....	\$2.40	\$3.00	\$3.60	\$4.50	\$5.40

NO. 11W—WITHOUT CENTER HEAD

Length, Inches..	4	6	9	12	18	24
Weight Each, Lbs	$\frac{1}{4}$	$\frac{1}{2}$	$\frac{3}{4}$	1	$1\frac{1}{4}$	$1\frac{3}{4}$
Each.....	\$1.50	\$1.80	\$2.40	\$3.00	\$3.90	\$4.80

The 4 in. is without center head or level.

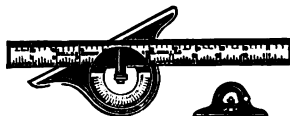
The 6, 9, 12, 18 and 24 in. have levels (in their stocks) and center heads.

PRICES OF SEPARATE PARTS OF SQUARES NO. 11

	Scale	Stock	Center Head
4 inch.....	\$0.80	\$0.90	\$0.75
6 ".....	1.20	.90	.75
9 ".....	1.50	1.20	.75
12 ".....	1.90	1.50	.75
18 ".....	3.00	1.50	.75
24 ".....	3.90	1.80	.75

Scribers.....15 cents each.

STARRETT BEVEL PROTRACTORS



NO. 12—FIG. 318

No. 12 Hardened Steel Blades, (same as used on No. 11 Squares), No. 4 Graduations, Black Enameled Iron Blade.

An adjustable rule, held firmly at any point by a thumb nut, passes through a revolving turret which is nicely graduated in degrees from 0 to 180, both right and left, and can be accurately adjusted to show any angle.

Length of Blade, Inches.....	9	12	18	24
Length of Head, Inches.....	7	7	7	7
Weight Each, Lbs.....	1	$1\frac{1}{2}$	$1\frac{1}{4}$	$1\frac{3}{4}$
Each.....	\$4.50	\$5.10	\$6.00	\$6.90

Protractor Head with level attachment, weight 12 oz. \$3.00



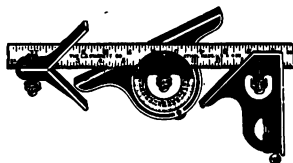
NO. 490—FIG. 319

No. 490 Hardened Steel Blade, Reversible Head, Graduated Turrets to Read Both Ways, from 0 to 180 Degrees; No. 4 Graduations with heavy figures on blade to read both ways, head 7 in. long.

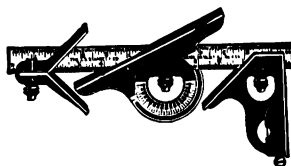
Length, Inches.....	9	12	18	24
Weight Each, Lbs.....	1	$1\frac{3}{8}$	$1\frac{3}{8}$	$1\frac{1}{2}$
Per Set.....	\$5.40	\$5.70	\$6.90	\$7.50

Protractor Head. With level attachment, weight 30 oz. Each.....\$4.20

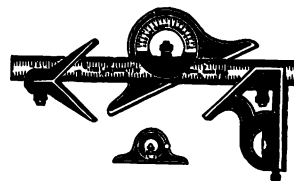
STARRETT COMBINATION SETS



NO. 433—FIG. 316



NO. 434—FIG. 3886



NO. 9—FIG. 315

The blades have heavy figures reading both ways graduated in Nos. 1, 2, 4, 7 and 16 graduations. No. 4 graduation sent unless otherwise ordered.

No. 9 Hardened Blade, showing combination Square (No. 11) with Center Head and 7 in. Bevel Protractor Head (No. 12) all on the No. 11 Square Scale.

Each head may be instantly removed, or replaced and used interchangeably with the scale.

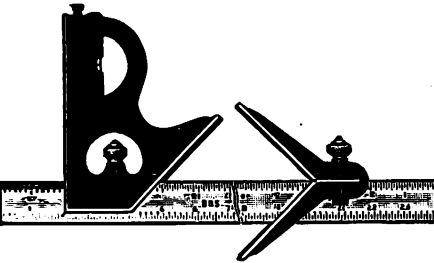
No. 433 Hardened Blade, consisting of No. 33 Combination Square with Hardened Blade and Heads and No. 492 Reversible Protractor Head with turret graduated to read both ways from 0 to 180 degrees.

No. 434. Same general design as No. 433 with additional feature of having the head No. 490 extended both sides of the blade. This greatly increases the usefulness of the tool as the same angles may be transferred from either side of the frame without resetting.

Length, inches	9	12	18	24
No. 9 Price per set.....	\$6.00	\$6.60	\$7.50	\$8.40
No. 433 Price per set.....	7.50	7.80	9.00	9.60
No. 434 Price per set.....	8.70	9.00	10.20	10.80

BROWN AND SHARPE COMBINATION SQUARES**NOS. 400 AND 402**

The heads of the squares are drop-forged and superior to those of cast iron. All blades are tempered and have parallel lines running lengthwise of the blade to aid in reading the various parts of an inch. Blades have Nos. 1, 2, 4, 7 and 16 graduations. No. 4 graduation sent unless otherwise ordered.

**FIG. 3887**

Size, Inches.....	6	9	12	18	24
No. 400 with Hardened Heads, Price each.....	\$3.90	\$4.50	\$4.80	\$6.00	\$6.60
No. 402 with Soft Heads, Price each	3.00	3.60	3.90	5.10	5.70

BROWN AND SHARPE IMPROVED UNIVERSAL BEVEL PROTRACTOR**NO. 495**

This Protractor is well adapted for all classes of work where angles are to be laid out or established.

One side of the stock is flat, thus permitting its being laid flat upon the paper or work.

The dial is accurately graduated to degrees the entire circle. The swivel turns on a large central stud, which is hardened and ground and can be rigidly clamped by a thumb nut.

The line of graduations is below the surface, protecting them from wear.

The Vernier adds materially to the use of the Protractor in obtaining fine measurements. It reads to 5 minutes or 1-12 of a degree.

By means of a small thumb pinion furnished as an attachment, extremely fine adjustments can be secured.

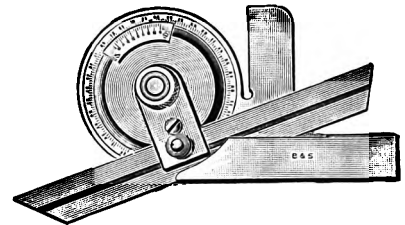
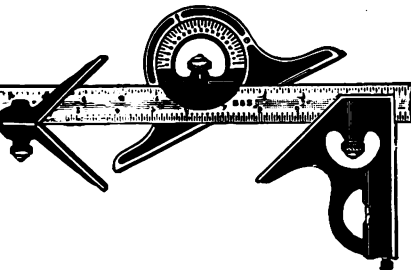
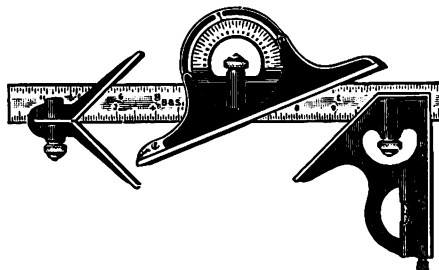
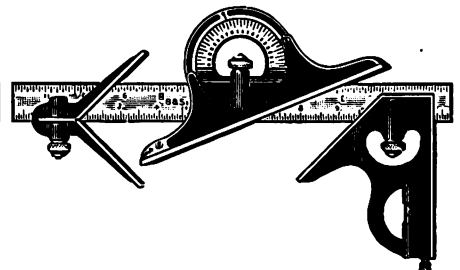
The blade is about 1-16" thick, can be moved back and forth its entire length and clamped independently of the dial, thus adapting this Protractor for work where others cannot be used.

Price with 6 Inch Blade, each.....\$14.50 With Morocco Case.....\$16.00

Price with 12 Inch Blade, each..... 15.75 With Morocco Case..... 17.75

Price with both 6 Inch Blade and 12

Inch Blade..... 16.75 With Morocco Case..... 18.75

**FIG. 3888****BROWN AND SHARPE COMBINATION SETS****NOS. 427 AND 428, FIG. 3889****NOS. 438 AND 439, FIG. 3890****NOS. 440 AND 441, FIG. 3891**

The revolving turret which carries the blade is fitted to a nicety and accurately graduated, being engine divided to 90 degrees either side of zero, and every care is taken to insure the zero being at right angles to the face of the head. It can be set at any angle and rigidly clamped by a thumb nut. An important feature is the round clamping groove in the blade. This allows the head to be quickly clamped and forces the blade against the side of the slot, square with the face of the head. It also admits the use of a stronger blade and clamping bolt than does the usual square groove and presents no sharp corners to collect dirt and impair the accuracy of the tool. Parallel lines running length-

wise of the blade are provided to aid in reading the various parts of an inch.

Another important feature is that all parts of these squares are made interchangeable, thus allowing repairs to be made by simply ordering the part needed and avoiding the necessity of returning the tool. The blades are tempered and have Nos. 1, 2, 4, 7 and 16 graduations. No. 4 graduation will be sent unless otherwise ordered.

Nos. 427, 428, 440 and 441 are the heavy type. Nos. 438, 439, 440, 441 have reversible protractor head.

With Square Heads, Hardened				With Soft Heads		
Numbers	427	438	440	428	439	441
Size, inches						
9	.....	\$8.70	.....	.....	\$7.20	.....
12	.....	9.00	.....	.....	7.50	.....
18	\$13.20	10.20	\$14.10	\$12.60	8.70	\$13.20
24	14.40	10.80	15.60	13.20	9.60	14.40

BROWN AND SHARPE STEEL SQUARES

HARDENED CAST STEEL TRY
NO. 540

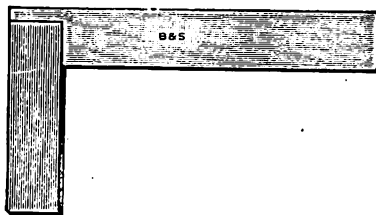


FIG. 3892

The length of blades as given is from the inner edge of the beam to end of blade.

Substantial Wooden Cases for protecting the Squares when not in use, furnished when desired.

Length of Blade	Length of Beam	Price	Price of Case
1½"	1½"	\$3.60	\$0.80
3	2½"	4.50	.80
4½	3½"	6.90	.80
6	4½"	9.00	.80
9	5½"	13.50	.80
12	7½"	18.00	1.25
15	8½"	30.00	1.50
18	10½"	34.50	2.50

THIN STEEL GRADUATED
NO. 547

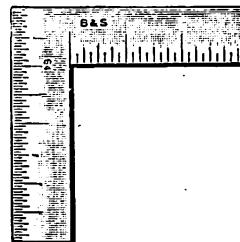


FIG. 3893

The 2" and 3" are divided to 16ths and 64ths of an inch one side and 32ds and 64ths on the other.

The 4", 6", 8" and 10" are divided on both sides to 16ths and 32ds of an inch.

Length of Blade	Width of Blade	Price
2"	½"	\$2.10
3	⅝"	2.70
4	¾"	3.60
6	1	5.10
8	1½"	6.60
10	1¾"	8.10

STANLEY TRY AND MITRE

NO. 2

Regularly graduated in eighths of an inch. Have rosewood handles, and blued blades.

Length of Blade.....inches	4½	6	7½	9	12
" Handle....."	3½	4	5	5¾	5¾
Weight, per dozen.....lbs.	3¾	4½	5¾	7½	8
Price, each.....	\$0.80	\$0.85	\$1.00	\$1.20	\$1.50

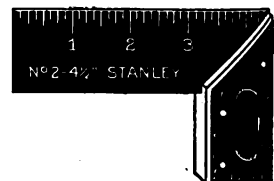


FIG. 343

STANDARD STEEL SQUARES

POLISHED

Body 24 x 2-inches, Tongue 16 x 1½-inch Plain Markings
How Marked

No.	Front	Back	Kind of Measure	Price Each
100	⅛, ⅜	⅜, ⅞, 1/10	Essex Board Measure, Brace Octagon and 1-100 Scale.....	\$2.00
3	⅛, ¼	⅛, ¼, ⅞	Brace and Essex Board Measure.....	1.80
14	⅛, ¼	¼	Essex Board Measure.....	1.40

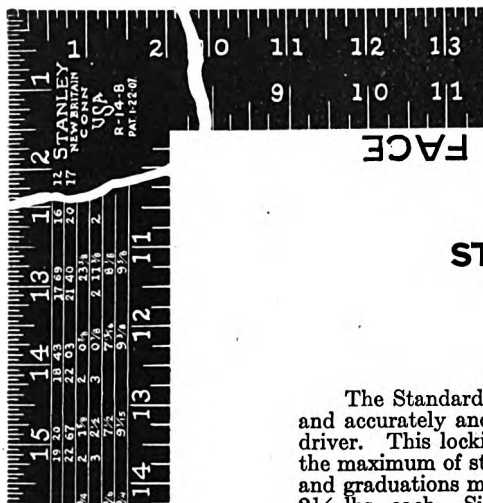


FIG. 342

STANDARD TAKE DOWN

T. D. NO. 101

The Standard Take-Down Square is made with a solid heel. The tongue fits easily and accurately and is instantly locked by an anchored cam. A coin answers as a screw driver. This locking device, together with the design of the tongue and socket, secures the maximum of strength and accuracy. No springs to fail or lose. All surfaces are flush and graduations match. Packed one complete square in a waterproof scabbard. Weight 2½ lbs. each. Size of body 24 x 2 inches, tongue 16 x 1½ inches. Steel with yellow markings. Has Rafter Table on the face of the body and Essex Board Measure on the back of the body. Also has Brace and Octagon Scale on tongue.

Price each.....\$5.00

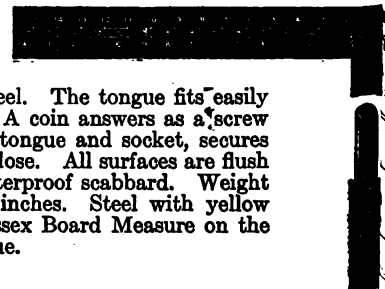
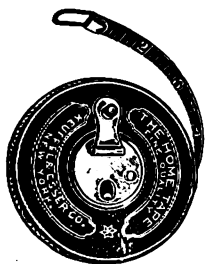


FIG. 34

K & E MEASURING TAPES

INSTANTANEOUS READINGS



HOME—FIG. 3894

HOME STEEL

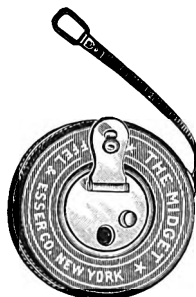
NO. 7352T AND 7355T

Tape $\frac{3}{8}$ inch wide, stout bent leather case, large center, long folding, self-opening handle. Center adjustable for wear. Nickel plated mountings. Graduations begin at outside end of ring.

MIDGET STEEL

NO. 7362T

Tape $\frac{1}{4}$ inch wide, stout bent leather case, large center, long, folding, self-opening handle. Center adjustable for wear. Nickel plated mountings. Graduations begin at outside end of ring.



MIDGET—FIG. 3895



DARTMOUTH—FIG. 3896

DARTMOUTH METALLIC

NO. 7442T

Tape $\frac{5}{8}$ inch wide, stout bent leather case, long folding handle. Center adjustable for wear, all mountings nickel plated. Line interwoven with metal, leather re-enforced end. Graduations begin at outside end of ring.

Nos. in 12ths.....	7352T	7355T	7362T	7442T
Nos. in 12ths (in. in 16ths)	.....	.....	.....	.....
Length, feet.....	50	100	50	50
Dia. Case, inches.....	$3\frac{1}{4}$	$4\frac{1}{8}$	$2\frac{7}{8}$	$4\frac{1}{4}$
Price, each.....	\$6.65	\$11.35	\$6.35	\$5.00

LUFKIN MEASURING TAPES

INSTANTANEOUS READINGS

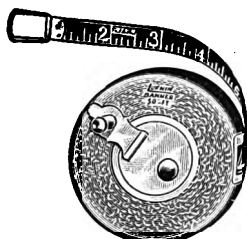
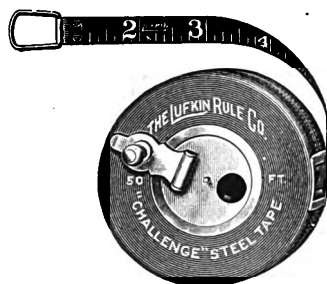
CHALLENGE JR.
FIG. 345

CHALLENGE JR. STEEL

Metal lined, hard leather case; nickel plated, brass folding handle and trimmings, $\frac{1}{4}$ inch flexible steel tape, graduated one side only in feet, inches and sixteenths.

CHALLENGE STEEL

Metal lined, hard leather case, nickel plated brass folding handle and trimmings, $\frac{3}{8}$ inch flexible steel tape, graduated one side, No. 260 to 266 in feet, inches and eighths; Nos. 263D and 266D in feet, 10ths and 100ths.

BANNER
FIG. 3897CHALLENGE
FIG. 346

METALLIC

Hard leather case, folding handle and nickel plated trimmings, $\frac{5}{8}$ inch best woven linen tape with metallic warp, graduated one side only, Nos. 500 to 506, in feet, inches and half inch. No. 503D in feet and 10ths.

BANNER STEEL

Cases made of steel, covered with handsome mottled black "Auto Leather" which is extraordinarily durable. The black case with nickel plated trimmings gives a very attractive appearance, and is fitted with a folding flush handle, opened by pressing button on opposite side. The Banner is designed to meet the demand for a serviceable steel tape at a moderate price. With $\frac{3}{8}$ inch tapes, marked feet, inches and 8ths, one side only. The measurements are guaranteed accurate.

METALLIC
FIG. 347

CHALLENGE					METALLIC				BANNER			CHALLENGE, JR.	
Nos. in 12ths....	260	263	265	266	500	503	505	506	550	553	556	1260	1263
Nos. in 10ths....	...	263D	...	266D	...	503D	...	...	...	...	...	...	...
Length, feet.....	25	50	75	100	25	50	75	100	25	50	100	25	50
Dia. Case, inches.	$2\frac{3}{4}$	$3\frac{1}{4}$	$4\frac{1}{4}$	$4\frac{1}{2}$	$3\frac{1}{4}$	$4\frac{1}{4}$	5	$5\frac{1}{2}$	$2\frac{1}{2}$	$3\frac{1}{4}$	$4\frac{1}{4}$	$2\frac{1}{4}$	$2\frac{1}{2}$
Price, each.....	\$3.65	\$4.45	\$5.80	\$7.55	\$2.40	\$3.50	\$4.35	\$5.45	\$3.10	\$3.90	\$6.50	\$3.50	\$4.25

STANLEY ZIG-ZAG HARDWOOD RULES

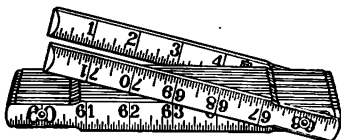


FIG. 337

Flexible Hardwood Riveted Joints, Brass Plated Trimmings,
Yellow Enamelled, MARKED ON REVERSE SIDE,
6 in. Folds, $\frac{5}{8}$ in. Wide.

Nos.....	402F	403F	404F	405F	406F	408F
Length, Feet...	2	3	4	5	6	8
Ap. Weight Per Dozen, Lbs...	1	1½	2	2¾	3¾	4¾
Price Each.....	\$.25	.38	.50	.63	.75	1.00

The Nos. 1, 2, 3, etc. on the above Zig-Zag Rules commence on the inside of Rule, allowing the Rule to lie flat when open. The figures 12, 24, 36, etc., are made extra large.

STANLEY BOXWOOD RULES

ONE FOOT, TWO FOLD
WITH LEFT HAND GRADUATED CALIPER



FIG. 339

No. 36½—Square Joint, Marked 8ths, 10ths, 12ths and 16ths of Inches, Caliper Graduated in 16ths of Inches, $1\frac{3}{8}$ in. Wide, Each.....\$0.65

TWO FEET, FOUR FOLD



FIG. 338

No. 68, Round Joint, Middle Plates, 8ths and 16ths Inch; 1 Inch Wide, Each.....\$0.25

TWO FEET, FOUR FOLD



FIG. 335

No. 62—Square Joint, Full Bound, Marked in 8ths, 10ths, 12ths and 16ths of Inches, Drafting Scale, 1 inch Wide, Each.....\$0.80

THREE FEET, FOUR FOLD



FIG. 336

No. 66½—Arch Joints, Unbound, Middle Plates, Marked 8ths and 16ths, 1 Inch Wide. Price each,.....\$0.75
No. 66¾—Arch Joints, Full Bound, Marked 8ths and 16ths of Inches, 1 Inch Wide, Each.....\$1.50

STANLEY LEVELS

METALLIC



No. 37-24"

NO. 37—FIG. 348

Cast frame, nickel plated, two plumbs, eclipse cast cover, adjustable, ground glasses, V shape bottom.

Length, Inches	6	9	12	18	24
Approximate weight doz., lbs.....	10½	15	22	36	51
Price each.....	\$2.90	3.45	3.95	4.75	5.55

HARDWOOD



FIG. 349

Heavy top plates, and two plumb glasses so set that the user can plumb from either end of the level without reversing.
No. 13, Adjustable, hardwood polished, brass tips.
No. 15—Same as No. 13, except that it is three-ply hardwood and has brass lips.

Length, in.....	24	26	28	30
Approx. Wt. Doz. lbs.....	40	40	40	40
Price, each, No. 13.....	\$2.90	2.90	3.05	3.05
Price, each, No. 15.....	3.45	3.45	3.85	3.85

IMPROVED ROBERTSON-THOMPSON STEAM INDICATORS

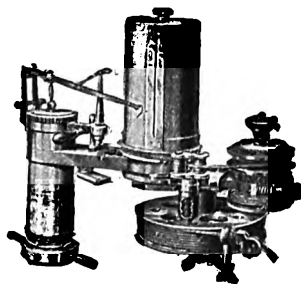


FIG. 350

Many steam users and owners of engines do not fully realize the importance of one of these indicators. It is about the only way to determine whether the engine is working economically, developing full power for the amount of fuel consumed, and if not, just how to cause it to do so.

Each Indicator is packed in a handsome hardwood case with lock and key and nickel plated trimmings and fitted with extra $\frac{1}{4}$ -inch area piston, detent motion, two springs as selected, either one three-way or two straight-way cocks, scales, cards, cord, oiler, and a plainly worded Comprehensive Instruction Book written by an engineer, for Engineers.

Improved Robertson-Thompson Indicator with Victor reducing wheel as shown in cut for steam.....\$100.00

Improved Robertson-Thompson Indicator without reducing wheel.....80.00

Reducing Wheel, separately, complete with bushings for all stroke engines.....20.00

STARRETT UNIVERSAL DIAL TEST INDICATOR NO. 196

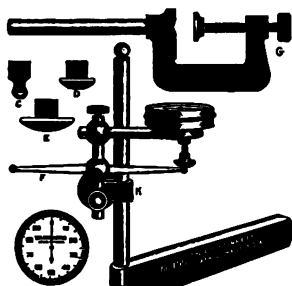


FIG. 297

PRICES

No. 196 A	Indicator with all attachments, as shown	\$12.90
No. 196 B	Indicator only, with 3 contact points	8.40
No. 196 F	Hole attachment.....	1.80
No. 196 G	Clamp.....	.90
No. 196 H	Tool post.....	.90
No. 196 K	Sleeve.....	.90
	Extra contact points, each.....	.15
No. 196 A,	Indicator complete, will be sent unless otherwise ordered.	

Simple, reliable, easily read and very sensitive. Slightest pressure upon contact point produces a movement of the hand on the dial. Circumference of dial divided into 100 equal spaces, each representing a movement of the contact point of one-thousandth of an inch. One revolution of the hand therefore indicates one-tenth inch, the capacity of the instrument being two-tenths. By bringing the contact point against the work with just enough pressure to give the hand one full turn, then setting it at 0, an opportunity is given for one full revolution of the hand to both right and left of 0, showing a rise or drop in the work and the amount of variation. A most valuable feature is the adjustable dial. By turning the knurled rim the dial may be instantly moved to bring the 0 mark to any point desired in relation to the hand. Each indicator is fitted with three hardened contact points for different classes of work. The special tool post and sleeve are useful in lathe work. For general work the indicator with sleeve K is adapted for use with 9 inch or 12 inch surface gauges, No. 57 A and B, and No. 257 A and B. The clamp G permits attaching the indicator to large lathe and planer tools, milling arbors, etc.

The attachment F more than doubles the value of the indicator, adapting it for use inside of holes, to reach over blockings on face plates, etc.

STARRETT SPEED INDICATORS

IMPROVED—NO. 106

AUTOMATIC REGISTERING—NO. 107



FIG. 354

The working parts are inclosed like a watch and as well made. The graduations show every revolution, and with two rows of figures read both right and left as the shaft may run. While looking at the watch each hundred revolutions may be counted by allowing the oval headed pin on the revolving disc to pass under the thumb as the instrument is pressed to its work.

A late improvement in this indicator consists in the rotating disc, which, being carried by friction, may be moved to the starting point where the raised knobs coincide. When the spindle is placed in connection with the revolving shaft, pressing the raised knob with the thumb will prevent the disc from rotating while the hand of the watch gets to the right position to take the time. By releasing the pressure the disc is liberated for counting the revolutions of the shaft when every 100 may be noted by feeling the knob pass under the thumb lightly pressed against it, thus relieving the eye, which has only to look on the watch to note the time.

The instrument is nickel plated, and has a rubber handle, so that it will not heat the fingers when run at high speed.

Prices

In Pasteboard box.....	\$1.80
In Leather case.....	2.40
Sent in pasteboard box unless otherwise ordered.	

HIGH SPEED—NO. 104

This indicator may be run at highest speed required without heating, and this on account of frictionless bearing against which the inner end of the spindle revolves.

The working parts of this instrument are encased, and the dial plate has two rows of figures reading right or left, as the shaft may run.

A late improvement in this indicator consists in the rotating disc, which, being carried by friction, may be moved to the starting point where the raised knobs coincide. When the spindle is placed in connection with the revolving shaft, pressing the raised knob with the thumb will prevent the disc from rotating, while the hand of the watch gets to the right position to take the time.



FIG. 351

By releasing the pressure the disc is liberated for counting the revolutions of the shaft when every 100 may be noted by

This instrument was devised to automatically register hundreds, units and tens and thus relieve the mind from keeping tally; also to furnish a better registering indicator at a more reasonable cost than has been on the market heretofore. The instrument will register 5,000 revolutions. The large dial is graduated into one hundred lines, each one representing a revolution of the spindle. The small dial has fifty lines cut upon its face, each representing one hundred revolutions of the spindle (or one complete turn of the large dial). A spring finger trip attached to the case engages with one of the lines in the small dial and holds it from revolving until the large dial makes one complete turn, when the trip pin passing under the spring trip lifts it, and the dial is frictionally carried along by the large plate one line thus showing that one hundred revolutions of the spindle have been made. The instrument has a hard rubber handle, making a safe insulator when used on electrical machinery.

. Nickel-plated.

Prices

In Pasteboard box.....	\$3.60
In Leather case.....	4.20

Sent in pasteboard box unless otherwise ordered.



FIG. 355

Prices

In Pasteboard box.....	\$1.20
In Leather case.....	1.80

We supply this indicator with a spindle 7½ inches long for use on Dairy Machines, etc., for 50 cents extra.

The indicator in pasteboard box (list \$1.00) will be sent unless otherwise ordered.

RUBBER TIPS FOR POINTED AND HOLLOW CENTERS

The hardened steel pointed spindle of all speed indicators is furnished with rubber tips for both pointed and centered shafts which remove the jar, run smoothly and produce a stronger frictional contact between the shaft and instrument.

VEEDER SPEED INDICATOR AND REVOLUTION COUNTERS

SPEED CLUTCH INDICATOR

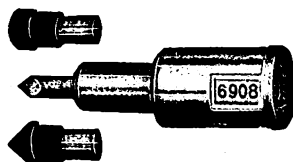


FIG. 352

No. 21 Speed Counter records the revolutions per minute of engines, motors, line shafting, machine spindles, etc. Simply hold the tip against revolving shaft or flywheel; apply slight pressure the moment you start timing; release pressure when minute is up. Clutch starts or stops recording mechanism instantly, giving accurate R.P.M. readings without need of stopwatch.

Price..... \$3.50

REVOLUTION COUNTERS

NO. 4

This small Revolution Counter counts number of revolutions of a shaft, indicating machine operations. The mechanism of this counter will stand a very high rate of speed, making it especially suitable for many types of small machines.

Price..... \$2.00

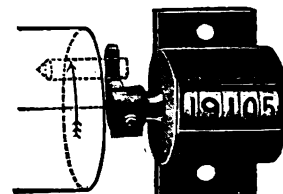


FIG. 3899

NO. 6

This small Rotary Ratchet Counter registers one for each throw of the lever, when same is moved through an angle of 40 to 60 degrees. A complete revolution of the lever registers ten. Very adaptable counter for small machines.

Price..... \$2.00

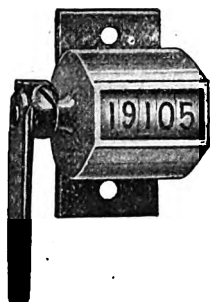


FIG. 3898

THE PORTLAND TALLY METER

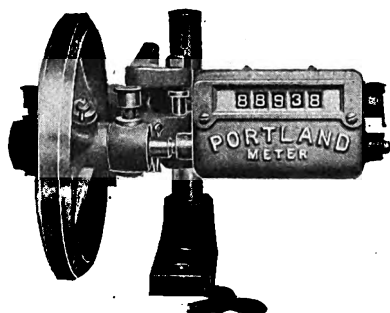


FIG. 356

For successful automatic lineal tallying of lumber or any other material such as cordage, rubber, tire and hose, wire rope, paper etc.

LIGHT WEIGHT MODEL NO. 1

Built especially for use on outside moulders or stickers at the infeed end. Built in three sizes: 10,000, 100,000 and 1,000,000 feet capacities.

MEDIUM WEIGHT MODEL NO. 2

Made to straddle the high spring guide on matchers and moulders and for use on the majority of rip saws, where it usually is attached to the movable fence. This model is as a rule furnished as a right hand machine for attaching to the stationary fence at the infeed end also. Built in three sizes: 10,000, 100,000 and 1,000,000 feet capacities.

HEAVY SERVICE METER MODEL NO. 3

Designed to meet the demand for a machine that will stand the strain on all fast feed machines. Built only right hand for

use on the infeed end. Built in two sizes: 100,000 and 1,000,000 feet capacities.

MODEL NO. 4

This meter is an underslung type, for use when fast feed machines are equipped with automatic feed tables and long hold-downs. On slat bed machines, this model may also be used on sizers, without feed tables etc., because the weight of the stock is sufficient to give the necessary friction. Built in two sizes: 100,000 and 1,000,000 feet capacities.

MODEL NO. 5

Used on any make of Fast Feed Matcher and Inside Moulder and while regularly furnished as a right hand machine, for use at the infeed end, may also be supplied left hand for use at the outfeed end, except of course in cases where a profiling attachment prevents placing the meter in that position. Built in two sizes: 100,000 and 1,000,000 feet capacities.

SPECIAL RESAW MODEL NO. 6

The No. 6 Meter is a special register designed to operate vertically by being attached to housings of resaws. It is built in three sizes and can be furnished to be attached either to the infeed or outfeed end.

When ordering, advise what position is desired.

Type	Weight Lbs.	Cap. 10M ft.	100M ft.	Mill. ft.
No. 1	18	\$23.00	\$28.00	\$33.00
No. 2	18	28.00	33.00	38.00
No. 3	27	.....	39.50	44.50
No. 4	50	.....	48.00	53.00
No. 5	27	.....	39.50	44.50
No. 6	27	26.50	32.50	36.50

A COMPARATIVE LIST OF CATALOGUE NUMBERS USED BY MANUFACTURERS OF DROP-FORGED WRENCHES

SINGLE HEAD ENGINEERS'

Armstrong Numbers.....	00	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Williams Numbers.....	00	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Billings & Spencer Numbers.....	1000	1001	1003	1005	1007	1009	1011	1012	1014	1016	1018	1020	1021	1022	1023	1024	1025
Armstrong Numbers.....	16	16½	17	18	19	19½	20										
Williams Numbers.....	16	16-A	17	18	19	19-A	20										
Billings & Spencer Numbers.....	1026	1027	1028	1029	1030	1031											

DOUBLE HEAD ENGINEERS'

Armstrong Numbers.....	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37
Williams Numbers.....	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37
Billings & Spencer Numbers.....	1101	1103	1107	1108	1112	1114	1118	1119	1123	1124	1128	1129	1132	1134	1136	1137	1140
Armstrong Numbers.....	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	53½
Williams Numbers.....	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	
Billings & Spencer Numbers.....	1141	1146	1148	1150	1151	1153	1154	1155	1156	1157	1158	1159	1160	1161	1162	1163	
Armstrong Numbers.....	54	55	55½	56	56½	57	57½										
Williams Numbers.....	54	55		56		57	57-A										
Billings & Spencer Numbers.....		1164		1165		1166											

THIN DOUBLE HEAD

Armstrong Numbers.....	623	623-A	623-B	623-C	623-D	626	626-A	626-B	626-D	629	629-A
Williams Numbers.....	623	624	625	623-D	623-E	626	627	628	626-X	629	630
Billings & Spencer Numbers...	1350	1351	1352		1350-W	1353	1354	1355	1353-W	1356	1357
Armstrong Numbers.....	629-B	629-C	632	632-A	632-B	632-C	635	635-A	635-B	635-C	638
Williams Numbers.....	631	629-E	632	633	634	632-X	635	636	637	635-G	638
Billings & Spencer Numbers...	1358	1356-W	1359	1360	1361	1359-W	1362	1363	1364	1362-W	1365
Armstrong Numbers.....	638-A	638-B									
Williams Numbers.....	639	640									
Billings & Spencer Numbers...	1366	1367									

TEXTILE MACHINE OFF-SET ANGLE DOUBLE HEAD

Armstrong Numbers.....	671-A	671-B	671-D	671-E	672-A	672-B	672-D	672-E	673-A	673-B	673-D	674-A
Williams Numbers.....	760-B	760-C	760-X	760-Y	761-A	761-C	761-X	761-Z	762-B	762-C	762-Y	763-A
Billings & Spencer Numbers.....	1555	1556	1553	1557	1559	1564	1558	1562	1566	1567		1571
Armstrong Numbers.....	674-B	674-D	675-A	675-B	675-D	676-A	676-B	676-D				
Williams Numbers.....	763-C	763-Y	764-A	764-B	764-X	765-A	765-C					
Billings & Spencer Numbers.....	1574	1569	1576	1578	1575	1580	1583	1582				

SET SCREW DOUBLE HEAD

Armstrong Numbers.....	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81
Williams Numbers.....	523	524	525	526	527	528	529	530	531	532	533	534	535	536	537	538	539
Billings & Spencer Numbers.....	1523	1524	1525	1526	1527	1528	1529	1530	1531	1532	1533	1534	1535	1536	1537	1538	1539
Armstrong Numbers.....	82	83	84														
Williams Numbers.....	540	541	542														
Billings & Spencer Numbers.....	1540	1541	1542														

DOUBLE HEAD CAP SCREW

Armstrong Numbers.....	21-A	22-A	23-A	23-B	24-A	25-A	25-B	25-C	26-A	27-A
Williams Numbers.....	721	722	723	723-A		725	725-A	725-B	726	727
Billings & Spencer Numbers...	1100	1102	1104	1105	1106	1109	1110	1111	1113	1116
Armstrong Numbers.....	27-B	28-A	28-S	29-A	30-A	31-A	31-B	31-C	32-A	32-B
Williams Numbers.....	27-C	728	28-S	729	730	731	731-A	731-B		732
Billings & Spencer Numbers...	1117-Sp	1117	1120-Sp	1120	1121	1125	1126	1130	1127	1131
Armstrong Numbers.....	33-A	33-B	34-A	35-A	36-A	37-A	37-S	38-A	39-A	39-B
Williams Numbers.....	733	33-C	734	735	736	737		738	739	739-A
Billings & Spencer Numbers...	1133	1132-Sp	1135	1138	1139	1142		1143	1145	1147

CAR

Armstrong Numbers.....	367	370	371	373	374	376	377	379	380	382	383	385	387	389
Williams Numbers.....	367	370	371	373	374	376	377	379	380	382	383	385	387	389
Billings & Spencer Numbers.....	1800	1801	1802	1803	1804	1805	1806	1807	1808	1809	1810	1811	1812	1813

STRUCTURAL

Armstrong Numbers.....	901	902	903	904	905	906	907	908	909	910
Williams Numbers.....	901	902	903	904	905	906	907	908	909	910
Billings & Spencer Numbers.....	1700	1701	1702	1703	1704	1705	1706	1707	1708	1709

CONSTRUCTION

Armstrong Numbers.....	221	222	223	224	225	226	227	228	229	230
Williams Numbers.....	201	202	203	204	205	206	207	208	209	210
Billings & Spencer Numbers.....			1675	1676	1677	1678	1679	1680	1681	1682

WILLIAMS SUPERIOR DROP-FORGED WRENCHES

Unfinished wrench forgings are milled only.

Semi-finished wrench forgings are milled, case-hardened, black lacquered and have heads ground bright.

Finished wrench forgings are milled, polished, case-hardened (mottled color) and lacquered—heads bright.

Stock milling—All openings are milled larger than stated in tables to allow for clearance of + .005 on smaller to + .040 on larger forgings.

Special milling to order, without extra charge, in lots of 100 or more of any size, for which we have the necessary special tools, in smaller quantities an extra charge sufficient to cover the "setting-up" cost will be made. A sample Nut or Screw, as gauge, should accompany orders.

Special wrenches made to order. Prices will be quoted upon receipt of models or drawings and specifications stating kind of finish (see above description) and quantity required.

When ordering please use numbers and state whether requirements are for U. S. Standard, Whitworth Standard or m/m openings and what condition of finish is desired.

Unless otherwise specified Semi-Finished Wrenches will be supplied.

SINGLE HEAD ENGINEERS' WRENCHES

15° ANGLE

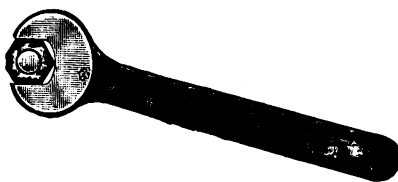


FIG. 357

Wrenches of this style but with handle tapered will be furnished on orders for the larger sizes, beginning with No. 11. Tapered handle wrenches of smaller sizes and flared handle wrenches of larger sizes can also be furnished if ordered in quantities.

The following Semi-finished and Finished Wrenches have hole in end of handle.

No. Hole	17 $\frac{5}{8}$	18 $\frac{3}{4}$	19 $\frac{7}{8}$	19A $\frac{7}{8}$	20 1	20A 1	21A $1\frac{1}{8}$	21B $1\frac{1}{8}$	21C $1\frac{1}{8}$	22A $1\frac{1}{4}$	22B $1\frac{1}{4}$
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For comparative list of catalogue numbers used by manufacturers of drop forged wrenches, see page 113.

Number	For U. S. Standard Nut; Size Bolt	Opening Milled	Extreme Length approx.	Thickness Head	PRICE		
					Unfinished	Semi-finished	Finished
00	$\frac{1}{8}$	$\frac{5}{16}$	3	$\frac{5}{16}$	\$0.09	\$0.14	\$0.22
0	$\frac{1}{8}$	$\frac{5}{16}$	3 $\frac{1}{2}$	$\frac{5}{16}$	.10	.15	.25
1	$\frac{1}{4}$	$\frac{1}{2}$	4	$\frac{1}{4}$	.12	.18	.28
2	$\frac{1}{4}$	$\frac{1}{2}$	4 $\frac{3}{4}$	$\frac{1}{4}$	.15	.22	.32
3	$\frac{3}{8}$	$\frac{1}{2}$	5 $\frac{5}{8}$	$\frac{1}{4}$	.18	.26	.38
4	$\frac{1}{2}$	$\frac{1}{2}$	6 $\frac{1}{2}$	$\frac{1}{4}$	.22	.32	.45
5	$\frac{1}{2}$	$\frac{7}{8}$	7 $\frac{1}{2}$	$\frac{1}{4}$	.26	.38	.54
6	$\frac{1}{2}$	$\frac{1}{2}$	8 $\frac{3}{8}$	$\frac{1}{4}$	.31	.46	.65
7	$\frac{5}{8}$	$\frac{1}{2}$	9 $\frac{1}{4}$	$\frac{1}{2}$	.40	.57	.82
8	$\frac{3}{4}$	$\frac{1}{4}$	11 $\frac{1}{8}$	$\frac{1}{4}$	.55	.75	1.05
9	$\frac{1}{8}$	$\frac{1}{2}$	13	$\frac{1}{4}$	.85	1.15	1.52
10	1	$\frac{1}{8}$	14 $\frac{3}{4}$	$\frac{3}{4}$	1.20	1.60	2.10
11	$1\frac{1}{8}$	$\frac{1}{8}$	16 $\frac{1}{2}$	$\frac{1}{2}$	1.65	2.10	2.80
12	$1\frac{1}{4}$	2	18 $\frac{1}{2}$	$\frac{1}{2}$	2.20	2.85	3.70
13	$1\frac{3}{8}$	2 $\frac{1}{8}$	20	1	2.80	3.65	4.70
14	$1\frac{1}{2}$	2 $\frac{5}{8}$	22	$1\frac{1}{8}$	3.45	4.60	5.80
15	$1\frac{5}{8}$	2 $\frac{3}{4}$	24	$1\frac{1}{8}$	4.15	5.60	7.10
16	$1\frac{3}{4}$	2 $\frac{3}{4}$	25 $\frac{1}{2}$	$1\frac{1}{4}$	4.90	6.70	8.50
16A	$1\frac{7}{8}$	2 $\frac{1}{2}$	27	$1\frac{1}{4}$	4.90	6.70	8.50
17	2	3 $\frac{1}{8}$	29 $\frac{1}{2}$	$1\frac{3}{8}$	7.50	10.25	13.00
18	2 $\frac{1}{4}$	3 $\frac{1}{2}$	33	$1\frac{1}{2}$	11.50	14.75	18.00
19	2 $\frac{1}{2}$	3 $\frac{7}{8}$	37	$1\frac{5}{8}$	17.00	21.00	25.00
19A	2 $\frac{3}{4}$	4 $\frac{1}{4}$	39	$1\frac{5}{8}$	17.00	21.00	25.00
20	3	4 $\frac{5}{8}$	41	$1\frac{7}{8}$	25.00	31.00	37.00
20A	3 $\frac{1}{4}$	5	43	$1\frac{7}{8}$	25.00	31.00	37.00
21A	3 $\frac{1}{2}$	5 $\frac{3}{8}$	45	2 $\frac{1}{2}$	40.00	52.00	64.00
21B	3 $\frac{3}{4}$	5 $\frac{3}{4}$	47	2 $\frac{1}{2}$	40.00	52.00	64.00
21C	4	6 $\frac{1}{8}$	49	2 $\frac{1}{2}$	40.00	52.00	64.00
22A	4 $\frac{1}{2}$	6 $\frac{7}{8}$	51	3	80.00	102.00	124.00
22B	5	7 $\frac{5}{8}$	53	3	80.00	102.00	124.00

WILLIAMS SUPERIOR DROP-FORGED WRENCHES**DOUBLE HEAD ENGINEERS' WRENCHES**

15° ANGLE



FIG. 358

For comparative list of catalogue numbers used by manufacturers of drop-forged wrenches, see page 113.

Number	For U. S. Standard Nuts; Size Bolts	Openings Milled	Extreme Length	Thickness Heads	PRICE		
					Unfinished	Semi- finished	Finished
21	$\frac{1}{8}$ & $\frac{1}{8}$	$\frac{1}{8}$ & $\frac{1}{8}$	$3\frac{1}{2}$	$\frac{1}{8}$	\$0.12	\$0.17	\$0.26
22	$\frac{1}{8}$ & $\frac{1}{4}$	$\frac{1}{8}$ & $\frac{1}{2}$	4	$\frac{1}{4}$	.14	.21	.32
23	$\frac{1}{8}$ & $\frac{1}{4}$	$\frac{1}{8}$ & $\frac{1}{2}$	4	$\frac{1}{4}$	.14	.21	.32
24	$\frac{1}{8}$ & $\frac{1}{8}$	$\frac{1}{8}$ & $\frac{1}{8}$	$4\frac{7}{8}$	$\frac{3}{8}$	.17	.25	.38
25	$\frac{1}{4}$ & $\frac{1}{8}$	$\frac{1}{2}$ & $\frac{1}{8}$	$4\frac{7}{8}$	$\frac{3}{8}$	.17	.25	.38
26	$\frac{1}{4}$ & $\frac{3}{8}$	$\frac{1}{2}$ & $\frac{1}{8}$	$5\frac{7}{8}$	$\frac{1}{8}$	.21	.31	.46
27	$\frac{1}{8}$ & $\frac{3}{8}$	$\frac{1}{8}$ & $\frac{1}{8}$	$5\frac{7}{8}$	$\frac{1}{8}$	.21	.31	.46
28	$\frac{1}{8}$ & $\frac{1}{8}$	$\frac{1}{8}$ & $\frac{3}{8}$	$6\frac{7}{8}$	$\frac{1}{8}$	.25	.37	.56
29	$\frac{3}{8}$ & $\frac{1}{8}$	$\frac{1}{8}$ & $\frac{3}{8}$	$6\frac{7}{8}$	$\frac{1}{8}$	.25	.37	.56
30	$\frac{3}{8}$ & $\frac{1}{2}$	$\frac{1}{8}$ & $\frac{7}{8}$	$7\frac{7}{8}$	$\frac{1}{8}$	.30	.45	.68
31	$\frac{1}{8}$ & $\frac{1}{2}$	$\frac{1}{8}$ & $\frac{7}{8}$	$7\frac{7}{8}$	$\frac{1}{8}$	.30	.45	.68
32	$\frac{1}{8}$ & $\frac{1}{8}$	$\frac{1}{8}$ & $\frac{1}{8}$	$8\frac{3}{4}$	$\frac{1}{8}$	.37	.55	.85
33	$\frac{1}{2}$ & $\frac{1}{8}$	$\frac{1}{8}$ & $\frac{1}{8}$	$8\frac{3}{4}$	$\frac{1}{8}$	.37	.55	.85
34	$\frac{1}{2}$ & $\frac{5}{8}$	$\frac{1}{8}$ & $1\frac{1}{8}$	$9\frac{3}{4}$	$\frac{1}{2}$	.46	.68	1.08
35	$\frac{1}{8}$ & $\frac{5}{8}$	$\frac{1}{8}$ & $1\frac{1}{8}$	$9\frac{3}{4}$	$\frac{1}{2}$	.46	.68	1.08
36	$\frac{1}{8}$ & $\frac{3}{4}$	$\frac{1}{8}$ & $1\frac{1}{4}$	$11\frac{5}{8}$	$\frac{1}{8}$	.66	.96	1.40
37	$\frac{1}{8}$ & $\frac{3}{4}$	$1\frac{1}{8}$ & $1\frac{1}{4}$	$11\frac{5}{8}$	$\frac{1}{8}$	.66	.96	1.40
38	$\frac{5}{8}$ & $\frac{7}{8}$	$1\frac{1}{8}$ & $1\frac{1}{8}$	$13\frac{1}{2}$	$\frac{1}{8}$	1.00	1.40	1.90
39	$\frac{3}{4}$ & $\frac{7}{8}$	$1\frac{1}{4}$ & $1\frac{1}{8}$	$13\frac{1}{2}$	$\frac{3}{4}$	1.00	1.40	1.90
40	$\frac{3}{4}$ & 1	$1\frac{1}{4}$ & $1\frac{5}{8}$	$15\frac{1}{2}$	$\frac{3}{4}$	1.40	1.90	2.60
41	$\frac{1}{8}$ & 1	$1\frac{1}{8}$ & $1\frac{5}{8}$	$15\frac{1}{2}$	$\frac{3}{4}$	1.40	1.90	2.60
42	$\frac{7}{8}$ & $1\frac{1}{8}$	$1\frac{1}{8}$ & $1\frac{3}{8}$	17	$\frac{1}{2}$	1.90	2.65	3.50
43	1 & $1\frac{1}{8}$	$1\frac{5}{8}$ & $1\frac{1}{8}$	17	$\frac{1}{2}$	1.90	2.65	3.50
44	1 & $1\frac{1}{4}$	$1\frac{5}{8}$ & 2	19	$\frac{3}{4}$	2.60	3.60	4.70
45	$1\frac{1}{8}$ & $1\frac{1}{4}$	$1\frac{1}{8}$ & 2	19	$\frac{3}{4}$	2.60	3.60	4.70
46	$1\frac{1}{8}$ & $1\frac{3}{8}$	$1\frac{1}{8}$ & $2\frac{1}{8}$	21	1	3.80	5.25	6.70
47	$1\frac{1}{4}$ & $1\frac{3}{8}$	2 & $2\frac{1}{8}$	21	1	3.80	5.25	6.70
48	$1\frac{1}{4}$ & $1\frac{1}{2}$	2 & $2\frac{3}{8}$	23	$1\frac{1}{8}$	5.20	7.00	8.80
49	$1\frac{3}{8}$ & $1\frac{1}{2}$	$2\frac{1}{8}$ & $2\frac{3}{8}$	23	$1\frac{1}{8}$	5.20	7.00	8.80
50	$1\frac{3}{8}$ & $1\frac{5}{8}$	$2\frac{1}{8}$ & $2\frac{3}{8}$	25	1 & $1\frac{1}{8}$	6.75	9.00	11.25
51	$1\frac{1}{2}$ & $1\frac{5}{8}$	$2\frac{3}{8}$ & $2\frac{1}{8}$	25	$1\frac{1}{8}$ & $1\frac{1}{8}$	7.40	9.90	12.40
52	$1\frac{1}{2}$ & $1\frac{3}{4}$	$2\frac{3}{8}$ & $2\frac{3}{4}$	27	$1\frac{1}{8}$ & $1\frac{1}{2}$	8.35	11.00	13.65
53	$1\frac{5}{8}$ & $1\frac{3}{4}$	$2\frac{1}{8}$ & $2\frac{3}{4}$	27	$1\frac{1}{8}$ & $1\frac{1}{2}$	9.00	12.00	15.00
54	$1\frac{5}{8}$ & 2	$2\frac{1}{8}$ & $3\frac{1}{8}$	31	$1\frac{1}{8}$ & $1\frac{3}{8}$	11.00	14.25	17.50
55	$1\frac{3}{4}$ & 2	$2\frac{3}{4}$ & $3\frac{1}{8}$	32	$1\frac{1}{2}$ & $1\frac{3}{8}$	12.00	15.50	19.00
56	$1\frac{3}{4}$ & $2\frac{1}{4}$	$2\frac{3}{4}$ & $3\frac{1}{2}$	34	$1\frac{1}{2}$ & $1\frac{1}{2}$	16.00	20.00	24.00
57	2 & $2\frac{1}{4}$	$3\frac{1}{8}$ & $3\frac{1}{2}$	36	$1\frac{3}{8}$ & $1\frac{1}{2}$	18.50	23.50	28.50
57A	2 & $2\frac{1}{2}$	$3\frac{1}{8}$ & $3\frac{7}{8}$	37	$1\frac{3}{8}$ & $1\frac{5}{8}$	23.00	28.00	33.00
58	$2\frac{1}{4}$ & $2\frac{1}{2}$	$3\frac{1}{2}$ & $3\frac{7}{8}$	38	$1\frac{1}{2}$ & $1\frac{5}{8}$	26.00	31.00	36.00
59	$2\frac{1}{4}$ & $2\frac{3}{4}$	$3\frac{1}{2}$ & $4\frac{1}{4}$	39	$1\frac{1}{2}$ & $1\frac{5}{8}$	26.00	31.00	36.00
60	$2\frac{1}{2}$ & $2\frac{3}{4}$	$3\frac{7}{8}$ & $4\frac{1}{4}$	40	$1\frac{5}{8}$ & $1\frac{5}{8}$	30.00	37.50	45.00
61	$2\frac{1}{2}$ & 3	$3\frac{7}{8}$ & $4\frac{5}{8}$	42	$1\frac{5}{8}$ & $1\frac{7}{8}$	38.00	47.00	56.00
62	$2\frac{3}{4}$ & 3	$4\frac{1}{4}$ & $4\frac{5}{8}$	44	$1\frac{5}{8}$ & $1\frac{7}{8}$	38.00	47.00	56.00
63	$2\frac{3}{4}$ & $3\frac{1}{2}$	$4\frac{1}{4}$ & $5\frac{3}{8}$	46	$1\frac{5}{8}$ & $2\frac{1}{2}$	55.00	67.50	80.00
64	3 & $3\frac{1}{2}$	$4\frac{5}{8}$ & $5\frac{3}{8}$	48	$1\frac{7}{8}$ & $2\frac{1}{2}$	65.00	77.50	90.00

WILLIAMS SUPERIOR DROP-FORGED WRENCHES

DOUBLE HEAD CHECK NUT OR "THIN" WRENCHES

15° ANGLE, — FOR CHECK, JAM OR LOCK NUTS, ETC.

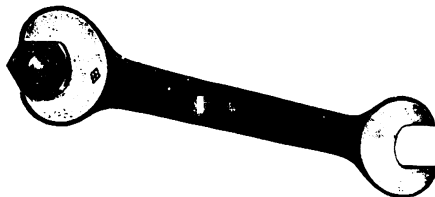


FIG. 359

This class of Wrench is guaranteed amply strong for its intended purposes but is not designed for severe service. For comparative list of catalogue numbers used by manufacturers of drop-forged wrenches, see page 113.

Number	For U. S. Standard Nuts; Size Bolts	Openings Milled	Extreme Length	Thickness Heads	PRICE		
					Unfinished	Semi-finished	Finished
623	$\frac{3}{16}$ & $\frac{1}{4}$	$\frac{11}{16}$ & $\frac{1}{2}$	$4\frac{3}{8}$	$\frac{5}{16}$ & $\frac{3}{8}$	\$0.17	\$0.25	\$0.38
624	$\frac{1}{8}$ & $\frac{1}{8}$	$\frac{11}{16}$ & $\frac{1}{2}$	$4\frac{3}{8}$	$\frac{5}{16}$ & $\frac{3}{8}$	.17	.25	.38
625	$\frac{1}{8}$ & $\frac{1}{8}$	$\frac{11}{16}$ & $\frac{1}{2}$	$4\frac{3}{8}$	$\frac{5}{16}$ & $\frac{3}{8}$	.17	.25	.38
626	$\frac{1}{4}$ & $\frac{3}{8}$	$\frac{11}{16}$ & $\frac{1}{2}$	$5\frac{1}{2}$	$\frac{5}{16}$ & $\frac{3}{8}$	.22	.32	.48
627	$\frac{1}{8}$ & $\frac{3}{8}$	$\frac{11}{16}$ & $\frac{1}{2}$	$5\frac{1}{2}$	$\frac{5}{16}$ & $\frac{3}{8}$	.22	.32	.48
628	$\frac{1}{8}$ & $\frac{3}{8}$	$\frac{11}{16}$ & $\frac{1}{2}$	$5\frac{1}{2}$	$\frac{5}{16}$ & $\frac{3}{8}$	.22	.32	.48
629	$\frac{3}{8}$ & $\frac{1}{2}$	$\frac{11}{16}$ & $\frac{1}{2}$	$6\frac{7}{8}$	$\frac{5}{16}$ & $\frac{3}{8}$	.28	.40	.60
630	$\frac{3}{8}$ & $\frac{1}{2}$	$\frac{11}{16}$ & $\frac{1}{2}$	$6\frac{7}{8}$	$\frac{5}{16}$ & $\frac{3}{8}$	.28	.40	.60
631	$\frac{1}{8}$ & $\frac{1}{2}$	$\frac{11}{16}$ & $\frac{1}{2}$	$6\frac{7}{8}$	$\frac{5}{16}$ & $\frac{3}{8}$	.28	.40	.60
632	$\frac{1}{8}$ & $\frac{1}{2}$	$\frac{11}{16}$ & $\frac{1}{2}$	$8\frac{1}{2}$	$\frac{1}{4}$ & $\frac{1}{2}$	.40	.56	.80
633	$\frac{1}{2}$ & $\frac{1}{2}$	$\frac{11}{16}$ & $\frac{1}{2}$	$8\frac{1}{2}$	$\frac{1}{4}$ & $\frac{1}{2}$	.40	.56	.80
634	$\frac{1}{2}$ & $\frac{1}{2}$	$\frac{11}{16}$ & $\frac{1}{2}$	$8\frac{1}{2}$	$\frac{1}{4}$ & $\frac{1}{2}$	.40	.56	.80
635	$\frac{5}{8}$ & $\frac{3}{4}$	$\frac{11}{16}$ & $\frac{1}{2}$	$10\frac{3}{8}$	$\frac{5}{16}$ & $\frac{3}{8}$	.60	.84	1.15
636	$\frac{5}{8}$ & $\frac{3}{4}$	$\frac{11}{16}$ & $\frac{1}{2}$	$10\frac{3}{8}$	$\frac{5}{16}$ & $\frac{3}{8}$	.60	.84	1.15
637	$\frac{5}{8}$ & $\frac{3}{4}$	$\frac{11}{16}$ & $\frac{1}{2}$	$10\frac{3}{8}$	$\frac{5}{16}$ & $\frac{3}{8}$	.60	.84	1.15
638	$\frac{5}{8}$ & $\frac{3}{4}$	$\frac{11}{16}$ & $\frac{1}{2}$	$12\frac{5}{8}$	$\frac{3}{8}$ & $\frac{1}{2}$	1.00	1.30	1.75
639	$\frac{3}{4}$ & $\frac{1}{2}$	$\frac{11}{16}$ & $\frac{1}{2}$	$12\frac{5}{8}$	$\frac{3}{8}$ & $\frac{1}{2}$	1.00	1.30	1.75
640	$\frac{3}{4}$ & 1	$\frac{11}{16}$ & $\frac{1}{2}$	$12\frac{5}{8}$	$\frac{3}{8}$ & $\frac{1}{2}$	1.00	1.30	1.75

SINGLE HEAD HEAVY CAP SCREW WRENCHES

15° ANGLE, — FOR HEXAGON HEAD CAP SCREWS

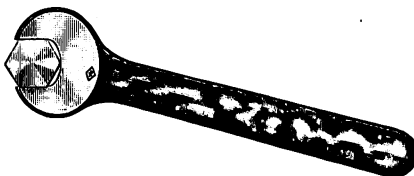


FIG. 360

This is a line of extra weight designed to withstand the strain in turning Cap Screws, and is considerably stronger than the screws themselves.

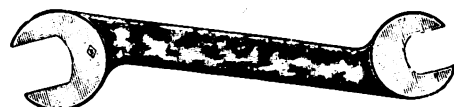
Number	For Hexagon Head Cap Screws; Diameter Screws	Opening Milled	Extreme Length	Thickness Heads	PRICE		
					Unfinished	Semi-finished	Finished
103	$\frac{3}{8}$	$\frac{1}{2}$	5	$\frac{1}{8}$	\$0.17	\$0.25	\$0.37
104	$\frac{1}{2}$	$\frac{3}{4}$	$5\frac{1}{2}$	$\frac{3}{8}$	.21	.31	.44
105	$\frac{1}{2}$	$\frac{3}{4}$	$6\frac{1}{2}$	$\frac{1}{2}$	.26	.38	.54
106	$\frac{1}{2}$	$\frac{3}{4}$	$7\frac{1}{4}$	$\frac{1}{2}$	.32	.46	.66
107	$\frac{3}{8}$	$\frac{1}{2}$	8	$\frac{1}{2}$	.40	.57	.80
108	$\frac{3}{4}$	1	$9\frac{1}{2}$	$\frac{3}{4}$	.52	.72	1.00
109	$\frac{1}{2}$	$1\frac{1}{8}$	11	$\frac{3}{4}$	.72	.96	1.30
110	1	$1\frac{1}{4}$	$12\frac{1}{2}$	$\frac{1}{2}$	1.00	1.30	1.70
111	$1\frac{1}{8}$	$1\frac{1}{2}$	14	$\frac{1}{2}$	1.35	1.70	2.20
112	$1\frac{1}{4}$	$1\frac{1}{2}$	$15\frac{1}{2}$	$1\frac{1}{8}$	1.70	2.10	2.75
113	$1\frac{3}{8}$	$1\frac{1}{2}$	17	$1\frac{1}{8}$	2.10	2.60	3.40

WILLIAMS SUPERIOR DROP-FORGED WRENCHES**DOUBLE HEAD TEXTILE MACHINE
WRENCHES**

22 1-2° ANGLE

FIG. 361

FIG. 362



For comparative list of catalogue numbers used by manufacturers of drop-forged wrenches, see page 113.

Number	For U. S. Standard Hexagon or Square Nuts; Size Bolts	Openings Milled	Extreme Length	Thickness Heads	PRICE		
					Unfinished	Semi- finished	Finished
760A	$\frac{1}{8}$ & $\frac{1}{4}$	$\frac{1}{8}$ & $\frac{1}{2}$	4 $\frac{3}{4}$	$\frac{1}{4}$	\$0.17	\$0.25	\$0.38
760B	$\frac{1}{8}$ & $\frac{1}{4}$	$\frac{1}{8}$ & $\frac{1}{2}$	4 $\frac{3}{4}$	$\frac{1}{4}$	.17	.25	.38
760C	$\frac{1}{8}$ & $\frac{1}{4}$	$\frac{1}{8}$ & $\frac{1}{2}$	4 $\frac{3}{4}$	$\frac{1}{4}$	.17	.25	.38
761A	$\frac{1}{8}$ & $\frac{1}{4}$	$\frac{1}{8}$ & $\frac{1}{2}$	5 $\frac{1}{4}$	$\frac{1}{8}$	.21	.31	.46
761B	$\frac{1}{8}$ & $\frac{1}{4}$	$\frac{1}{8}$ & $\frac{1}{2}$	5 $\frac{1}{4}$	$\frac{1}{8}$	.21	.31	.46
761C	$\frac{1}{8}$ & $\frac{1}{4}$	$\frac{1}{8}$ & $\frac{1}{2}$	5 $\frac{3}{4}$	$\frac{1}{8}$	.21	.31	.46
762A	$\frac{1}{8}$ & $\frac{1}{4}$	$\frac{1}{8}$ & $\frac{1}{2}$	7	$\frac{3}{8}$	.27	.40	.60
762B	$\frac{1}{8}$ & $\frac{1}{4}$	$\frac{1}{8}$ & $\frac{1}{2}$	7	$\frac{3}{8}$	.27	.40	.60
762C	$\frac{1}{8}$ & $\frac{1}{4}$	$\frac{1}{8}$ & $\frac{1}{2}$	7	$\frac{3}{8}$	.27	.40	.60
763A	$\frac{1}{8}$ & $\frac{1}{4}$	$\frac{1}{8}$ & $\frac{1}{2}$	8 $\frac{1}{4}$	$\frac{1}{8}$	.36	.53	.78
763B	$\frac{1}{8}$ & $\frac{1}{4}$	$\frac{1}{8}$ & $\frac{1}{2}$	8 $\frac{1}{4}$	$\frac{1}{8}$	.36	.53	.78
763C	$\frac{1}{8}$ & $\frac{1}{4}$	$\frac{1}{8}$ & $\frac{1}{2}$	8 $\frac{1}{4}$	$\frac{1}{8}$	.36	.53	.78
764A	$\frac{1}{8}$ & $\frac{1}{4}$	$\frac{1}{8}$ & $\frac{1}{2}$	9 $\frac{1}{2}$	$\frac{1}{2}$	.50	.72	1.05
764B	$\frac{1}{8}$ & $\frac{1}{4}$	$\frac{1}{8}$ & $\frac{1}{2}$	9 $\frac{1}{2}$	$\frac{1}{2}$	.50	.72	1.05
764C	$\frac{1}{8}$ & $\frac{1}{4}$	$\frac{1}{8}$ & $\frac{1}{2}$	9 $\frac{1}{2}$	$\frac{1}{2}$	.50	.72	1.05
765A	$\frac{1}{8}$ & $\frac{1}{4}$	$\frac{1}{8}$ & $\frac{1}{2}$	11	$\frac{1}{8}$	.68	.96	1.40
765B	$\frac{1}{8}$ & $\frac{1}{4}$	$\frac{1}{8}$ & $\frac{1}{2}$	11	$\frac{1}{8}$	.68	.96	1.40
765C	$\frac{1}{8}$ & $\frac{1}{4}$	$\frac{1}{8}$ & $\frac{1}{2}$	11	$\frac{1}{8}$	.68	.96	1.40

SELECTED SET FOR TEXTILE MACHINERY WITH OPENINGS FOR EVERY BOLT SIZE FROM 3-16" TO 7-8"

Furnished in either cardboard box or canvas roll.

760B	$\frac{1}{8}$ & $\frac{1}{4}$	$\frac{1}{8}$ & $\frac{1}{2}$	4 $\frac{3}{4}$	$\frac{1}{4}$	\$0.17	\$0.25	\$0.38
761C	$\frac{1}{8}$ & $\frac{1}{4}$	$\frac{1}{8}$ & $\frac{1}{2}$	5 $\frac{3}{4}$	$\frac{1}{8}$	.21	.31	.46
763A	$\frac{1}{8}$ & $\frac{1}{4}$	$\frac{1}{8}$ & $\frac{1}{2}$	8 $\frac{1}{4}$	$\frac{1}{8}$	.36	.53	.78
764B	$\frac{1}{8}$ & $\frac{1}{4}$	$\frac{1}{8}$ & $\frac{1}{2}$	9 $\frac{1}{2}$	$\frac{1}{2}$	.50	.72	1.05
765C	$\frac{1}{8}$ & $\frac{1}{4}$	$\frac{1}{8}$ & $\frac{1}{2}$	11	$\frac{1}{8}$	.68	.96	1.40
Prices of Set in Roll, \$0.45 List Extra					\$1.92	\$2.77	\$4.07

DOUBLE HEAD SET SCREW WRENCHES

22 1-2° ANGLE



The openings may be milled larger than stated in table.

FIG. 363

For comparative list of catalogue numbers used by manufacturers of drop-forged wrenches, see page 113.

Number	For Set Screws; Size	Extreme Length	Thickness Head	PRICE		
				Unfinished	Semi- finished	Finished
523	$\frac{1}{8}$ & $\frac{1}{4}$	3 $\frac{1}{2}$	$\frac{1}{8}$	\$0.14	\$0.20	\$0.30
524	$\frac{1}{8}$ & $\frac{1}{4}$	4 $\frac{1}{4}$	$\frac{1}{8}$	.16	.24	.35
525	$\frac{1}{8}$ & $\frac{1}{4}$	4 $\frac{1}{4}$	$\frac{1}{8}$	.16	.24	.35
526	$\frac{1}{8}$ & $\frac{1}{4}$	5	$\frac{1}{8}$	.19	.29	.42
527	$\frac{1}{8}$ & $\frac{1}{4}$	5	$\frac{1}{8}$	.19	.29	.42
528	$\frac{1}{8}$ & $\frac{1}{4}$	5 $\frac{3}{4}$	$\frac{3}{8}$	.24	.35	.52
529	$\frac{1}{8}$ & $\frac{1}{4}$	5 $\frac{3}{4}$	$\frac{3}{8}$	.24	.35	.52
530	$\frac{1}{8}$ & $\frac{1}{4}$	6 $\frac{3}{8}$	$\frac{1}{2}$	.30	.45	.66
531	$\frac{1}{8}$ & $\frac{1}{4}$	6 $\frac{3}{8}$	$\frac{1}{2}$	.30	.45	.66
532	$\frac{1}{8}$ & $\frac{1}{4}$	7 $\frac{1}{2}$	$\frac{1}{2}$	.36	.54	.80
533	$\frac{1}{8}$ & $\frac{1}{4}$	7 $\frac{1}{2}$	$\frac{1}{2}$	.36	.54	.80
534	$\frac{1}{8}$ & $\frac{1}{4}$	8 $\frac{1}{2}$	$\frac{1}{2}$	.44	.65	.96
535	$\frac{1}{8}$ & $\frac{1}{4}$	8 $\frac{1}{2}$	$\frac{1}{2}$	.44	.65	.96
536	$\frac{1}{8}$ & $\frac{1}{4}$	9 $\frac{3}{4}$	$\frac{3}{8}$	.56	.80	1.15
537	$\frac{1}{8}$ & $\frac{1}{4}$	9 $\frac{3}{4}$	$\frac{3}{8}$	.56	.80	1.15
538	$\frac{1}{8}$ & $\frac{1}{4}$	11	$\frac{1}{2}$	.72	1.00	1.40
539	$\frac{1}{8}$ & $\frac{1}{4}$	11	$\frac{1}{2}$	.72	1.00	1.40
540	$\frac{1}{8}$ & $\frac{1}{4}$	12 $\frac{1}{2}$	$\frac{3}{4}$	.98	1.30	1.75
541	$\frac{1}{8}$ & $\frac{1}{4}$	12 $\frac{1}{2}$	$\frac{3}{4}$	.98	1.30	1.75
542	$\frac{1}{8}$ & $\frac{1}{4}$	14	$\frac{1}{2}$	1.35	1.75	2.25
543	$\frac{1}{8}$ & $\frac{1}{4}$	14	$\frac{1}{2}$	1.35	1.75	2.25

WILLIAMS SUPERIOR DROP-FORGED WRENCHES**DOUBLE HEAD CAP SCREW WRENCHES**

15° ANGLE

FOR U.S.S. HEXAGON HEAD CAP SCREWS



FOR S.A.E. CAP SCREWS AND NUTS

FIG. 364

For comparative list of catalogue numbers used by manufacturers of drop forged wrenches, see page 113.

Number	For U.S.S. Hexagon Head Cap Screws; Diameter Screws	S. A. E. Std. Nuts and Cap Screws	Openings Milled	Extreme Length	PRICE		
					Un-finished	Semi-finished	Finished
721	$\frac{1}{8}$ & $\frac{3}{16}$		$\frac{1}{8}$ & $\frac{3}{8}$	3½	\$.12	\$.17	\$.26
722	$\frac{1}{8}$ & $\frac{1}{4}$		$\frac{1}{8}$ & $\frac{1}{2}$	4	.14	.21	.32
723	$\frac{1}{8}$ & $\frac{1}{4}$		$\frac{1}{8}$ & $\frac{1}{2}$	4	.14	.21	.32
723A	$\frac{1}{8}$ & $\frac{1}{4}$		$\frac{1}{8}$ & $\frac{1}{2}$	4	.14	.21	.32
725	$\frac{1}{4}$ & $\frac{3}{8}$	$\frac{1}{4}$ & $\frac{3}{8}$	$\frac{1}{2}$ & $\frac{1}{2}$	4½	.17	.25	.38
725A	$\frac{1}{4}$ & $\frac{3}{8}$	$\frac{1}{4}$ & $\frac{3}{8}$	$\frac{1}{2}$ & $\frac{1}{2}$	4½	.17	.25	.38
725B	$\frac{1}{4}$ & $\frac{3}{8}$	$\frac{1}{4}$ & $\frac{3}{8}$	$\frac{1}{2}$ & $\frac{1}{2}$	4½	.17	.25	.38
726	$\frac{1}{8}$ & $\frac{1}{4}$	$\frac{1}{8}$ & $\frac{1}{4}$	$\frac{1}{2}$ & $\frac{5}{8}$	5½	.21	.31	.46
727	$\frac{3}{8}$ & $\frac{1}{2}$	$\frac{3}{8}$ & $\frac{1}{2}$	$\frac{1}{2}$ & $\frac{5}{8}$	5½	.21	.31	.46
728	$\frac{3}{8}$ & $\frac{1}{2}$	$\frac{3}{8}$ & $\frac{1}{2}$	$\frac{1}{2}$ & $\frac{3}{4}$	6½	.25	.37	.56
729	$\frac{1}{2}$ & $\frac{1}{2}$	$\frac{1}{2}$ & $\frac{1}{2}$	$\frac{5}{8}$ & $\frac{3}{4}$	6½	.25	.37	.56
730	$\frac{1}{2}$ & $\frac{1}{2}$	$\frac{1}{2}$ & $\frac{1}{2}$	$\frac{5}{8}$ & $\frac{3}{4}$	7½	.30	.45	.68
731	$\frac{1}{2}$ & $\frac{5}{8}$	$\frac{1}{2}$ & $\frac{5}{8}$	$\frac{3}{4}$ & $\frac{1}{2}$	7½	.30	.45	.68
731A	$\frac{1}{2}$ & $\frac{5}{8}$	$\frac{1}{2}$ & $\frac{5}{8}$	$\frac{3}{4}$ & $\frac{1}{2}$	7½	.30	.45	.68
731B	$\frac{1}{2}$ & $\frac{5}{8}$	$\frac{1}{2}$ & $\frac{5}{8}$	$\frac{3}{4}$ & $\frac{1}{2}$	7½	.30	.45	.68
732	$\frac{5}{8}$ & $\frac{3}{4}$	$\frac{5}{8}$ & $\frac{3}{4}$	$\frac{1}{2}$ & 1	8¾	.37	.55	.85
733	$\frac{5}{8}$ & $\frac{3}{4}$	$\frac{5}{8}$ & $\frac{3}{4}$	$\frac{1}{2}$ & 1	8¾	.37	.55	.85
734	$\frac{5}{8}$ & $\frac{3}{4}$	$\frac{5}{8}$ & $\frac{3}{4}$	$\frac{1}{2}$ & 1	9¾	.46	.68	1.08
735	$\frac{3}{4}$ & 1	$\frac{3}{4}$ & 1	1 & $1\frac{1}{8}$	9¾	.46	.68	1.08
736	$\frac{3}{4}$ & 1	$\frac{3}{4}$ & 1	1 & $1\frac{1}{4}$	11½	.66	.96	1.40
737	$\frac{1}{2}$ & 1	$\frac{1}{2}$ & 1	$1\frac{1}{8}$ & $1\frac{1}{4}$	11½	.66	.96	1.40
738	$\frac{1}{2}$ & $1\frac{1}{8}$	$\frac{1}{2}$ & $1\frac{1}{8}$	$1\frac{1}{8}$ & $1\frac{3}{8}$	13½	1.00	1.40	1.90
739	1 & $1\frac{1}{8}$	$\frac{7}{8}$ & 1	$1\frac{1}{4}$ & $1\frac{3}{8}$	13½	1.00	1.40	1.90
739A	1 & $1\frac{1}{4}$	$\frac{7}{8}$ & 1	$1\frac{1}{4}$ & $1\frac{1}{2}$	13½	1.00	1.40	1.90
739B	$1\frac{1}{8}$ & $1\frac{1}{4}$	$\frac{7}{8}$ & 1	$1\frac{3}{8}$ & $1\frac{1}{2}$	13½	1.00	1.40	1.90
37	1	$\frac{3}{4}$ & $\frac{7}{8}$	$1\frac{1}{8}$ & $1\frac{1}{4}$	11½	.66	.96	1.40
39	1	$\frac{7}{8}$ & 1	$1\frac{1}{4}$ & $1\frac{1}{2}$	13½	1.00	1.40	1.90

DOUBLE HEAD HEAVY CAP SCREW WRENCHES

15° ANGLE

FOR HEXAGON HEAD CAP SCREWS



FIG. 365

Number	For Hexagon Head Cap Screws; Diameter Screws	Openings Milled	Extreme Length	Thickness Heads	PRICE		
					Un-finished	Semi-finished	Finished
126	$\frac{1}{4}$ & $\frac{3}{8}$	$\frac{1}{8}$ & $\frac{1}{2}$	5½	$\frac{1}{4}$ & $\frac{1}{2}$	\$.20	\$.30	\$.45
127	$\frac{1}{8}$ & $\frac{3}{8}$	$\frac{1}{8}$ & $\frac{1}{2}$	5½	$\frac{1}{4}$ & $\frac{1}{2}$	.20	.30	.45
128	$\frac{1}{8}$ & $\frac{1}{2}$	$\frac{1}{8}$ & $\frac{1}{2}$	6½	$\frac{1}{8}$ & $\frac{3}{8}$	.25	.37	.54
129	$\frac{1}{8}$ & $\frac{1}{2}$	$\frac{1}{8}$ & $\frac{1}{2}$	6½	$\frac{1}{8}$ & $\frac{3}{8}$	.25	.37	.54
130	$\frac{3}{8}$ & $\frac{1}{2}$	$\frac{1}{8}$ & $\frac{1}{2}$	7	$\frac{1}{8}$ & $\frac{3}{8}$	.30	.45	.68
131	$\frac{1}{2}$ & $\frac{1}{2}$	$\frac{1}{8}$ & $\frac{1}{2}$	7	$\frac{3}{8}$ & $\frac{1}{2}$	.30	.45	.68
132	$\frac{1}{2}$ & $\frac{1}{2}$	$\frac{1}{8}$ & $\frac{1}{2}$	7¾	$\frac{3}{8}$ & $\frac{1}{2}$	.37	.55	.85
133	$\frac{1}{2}$ & $\frac{1}{2}$	$\frac{1}{8}$ & $\frac{1}{2}$	7¾	$\frac{3}{8}$ & $\frac{1}{2}$	.37	.55	.85
134	$\frac{1}{2}$ & $\frac{1}{2}$	$\frac{1}{8}$ & $\frac{1}{2}$	8½	$\frac{1}{2}$ & $\frac{1}{2}$	.46	.68	1.05
135	$\frac{1}{2}$ & $\frac{1}{2}$	$\frac{1}{8}$ & $\frac{1}{2}$	8½	$\frac{1}{2}$ & $\frac{1}{2}$	.46	.68	1.05
136	$\frac{1}{2}$ & $\frac{1}{2}$	$\frac{1}{8}$ & $\frac{1}{2}$	10½	$\frac{1}{2}$ & $\frac{1}{2}$	.65	.90	1.30
137	$\frac{1}{2}$ & $\frac{1}{2}$	$\frac{1}{8}$ & $\frac{1}{2}$	10½	$\frac{1}{2}$ & $\frac{1}{2}$	.65	.90	1.30
138	$\frac{3}{4}$ & $\frac{1}{2}$	$\frac{1}{8}$ & $\frac{1}{2}$	11½	$\frac{1}{2}$ & $\frac{1}{2}$	.95	1.25	1.70
139	$\frac{3}{4}$ & $\frac{1}{2}$	$\frac{1}{8}$ & $\frac{1}{2}$	11½	$\frac{1}{2}$ & $\frac{1}{2}$	.95	1.25	1.70
140	$\frac{3}{4}$ & 1	$\frac{1}{8}$ & $\frac{1}{2}$	13½	$\frac{3}{4}$ & $\frac{1}{2}$	1.30	1.65	2.20
141	$\frac{3}{4}$ & 1	$\frac{1}{8}$ & $\frac{1}{2}$	13½	$\frac{3}{4}$ & $\frac{1}{2}$	1.30	1.65	2.20
142	$\frac{1}{2}$ & $1\frac{1}{8}$	$\frac{1}{8}$ & $\frac{1}{2}$	14¾	$\frac{1}{2}$ & $\frac{1}{2}$	1.70	2.15	2.80
143	1 & $1\frac{1}{8}$	$\frac{1}{8}$ & $\frac{1}{2}$	14¾	$\frac{1}{2}$ & $\frac{1}{2}$	1.70	2.15	2.80
144	1 & $1\frac{1}{4}$	$\frac{1}{8}$ & $\frac{1}{2}$	16¾	$\frac{1}{2}$ & $\frac{1}{2}$	2.15	2.75	3.50
145	$1\frac{1}{8}$ & $1\frac{1}{4}$	$\frac{1}{8}$ & $\frac{1}{2}$	16¾	$\frac{1}{2}$ & $\frac{1}{2}$	2.15	2.75	3.50

WILLIAMS SUPERIOR DROP-FORGED WRENCHES**DOUBLE HEAD CAR WRENCHES****22½° ANGLE—LONG LEVERAGE**

For comparative list of catalogue numbers used by manufacturers of drop forged wrenches, see page 113.

Number	For U. S. Standard Nuts; Size Bolts	Openings	Ex-treme Length	Thick-ness Head	Price	
					Un-finished	Semi-finished
367	¾ & 1½	1½ & 1½	12	1½ & 1½	\$0.55	\$0.75
370	1½ & 5/8	1½ & 1½	19	1½ & 1½	.95	1.25
371	1½ & ¾	1½ & 1½	19	1½ & 1½	1.15	1.55
373	5/8 & ¾	1½ & 1½	20	1½ & 1½	1.15	1.55
374	5/8 & 7/8	1½ & 1½	21	1½ & 1½	1.35	1.85
376	¾ & 7/8	1½ & 1½	21	1½ & 1½	1.35	1.85
377	¾ & 1	1½ & 1½	22	1½ & 1½	1.65	2.25
379	7/8 & 1	1½ & 1½	22	1½ & 1½	1.65	2.25
380	7/8 & 1½	1½ & 1½	23	1½ & 1½	1.95	2.65
382	1 & 1½	1½ & 1½	23	1½ & 1½	1.95	2.65
383	1 & 1¼	1½ & 2½	24	1½ & 1½	2.25	3.15
385	1½ & 1¼	1½ & 2½	24	1½ & 1½	2.25	3.15
387	1½ & 1½	1½ & 2½	25	1½ & 1½	3.40	4.50
389	1¼ & 1½	2½ & 2½	25	1½ & 1½	3.40	4.50



FIG. 367

Unfinished are broached or milled only.
Semi-Finished are broached, case-hardened all over; heads not ground.

STRUCTURAL WRENCHES**STRAIGHT OPENING**

For comparative list of catalogue numbers used by manufacturers of drop forged wrenches, see page 113.

Number	For U. S. Standard Nut; Size Bolt	Open-ing	Ex-treme Length	Thick-ness Head	Handle Offset	Price	
						Un-finished	Semi-finished
901	¼	1½	8	3/8	1½	\$0.33	\$0.40
902	5/8	1½	8	3/8	1½	.33	.40
903	5/8	1½	9½	1½	1½	.40	.52
904	1½	1½	9½	1½	1½	.40	.52
905	1½	1½	11	1½	1	.52	.70
906	1½	1	11	1½	1	.52	.70
907	5/8	1½	13	1½	1½	.74	.98
908	¾	1½	15	5/8	1¼	1.02	1.34
909	¾	1½	17	1½	1½	1.40	1.80
910	1	1½	19	3/4	1½	1.90	2.50
910A	1½	1½	19	3/4	1½	1.90	2.50
911	1½	1½	21	7/8	1½	3.00	3.75
912	1¼	2½	21	7/8	1½	3.00	3.75

FIG. 366

The tang is for bringing bolt-holes into line and for insertion into convenient openings when wrench is not in use, preventing loss and keeping tool in sight.

The offset in handle provides for clearance of obstructions and safety for the hands of operator. Unfinished are milled only.

Semi-Finished are milled, case-hardened all over; heads not ground.

CONSTRUCTION WRENCHES**15° ANGLE**

For comparative list of catalogue numbers used by manufacturers of drop forged wrenches see page 113.

Number	For U. S. Standard Nut; Size Bolt	Opening, Milled	Ex-treme Length	Thick-ness Head	Price	
					Un-finished	Semi-finished
201	¼	1½	8	3/8	\$0.28	\$0.35
202	1½	1½	8	3/8	.28	.35
203	5/8	1½	9½	1½	.35	.45
204	1½	1½	9½	1½	.35	.45
205	1½	1½	11	1½	.45	.58
206	1½	1½	11	1½	.45	.58
207	5/8	1½	13	1½	.62	.80
208	¾	1½	15	5/8	.86	1.10
209	1½	1½	17	1½	1.18	1.50
210	1	1½	19	3/4	1.60	2.10
211	1½	1½	21	7/8	2.20	3.00
212	1¼	2	21	7/8	2.20	3.00

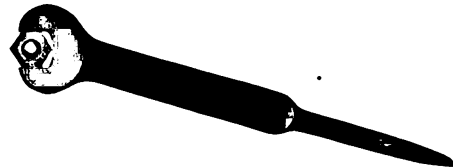


FIG. 368

The tang is for bringing bolt-holes into line and for insertion into convenient openings when wrench is not in use, preventing loss and keeping tool in sight.

Unfinished are milled only.

Semi-Finished are milled, case-hardened all over; heads not ground.

SETS OF DROP-FORGED WRENCHES

A comparative list of catalogue numbers used by manufacturers of drop-forged wrenches.

Williams Nos.....	1	2-S	2	3	5-S	5	4	8 & 9	11	12	35	44
Armstrong Nos.....	1	2	2-A	3	5	5-A	6	9	11-M	12-M	35	44
Billings & Spencer Nos.....	1	...	2	..	...	8	7	5	....	....	14	..

WILLIAMS SUPERIOR DROP-FORGED WRENCH SETS

WITH OPENINGS FOR POPULAR S. A. E. AND U. S. STANDARD NUTS AND CAP SCREWS

LIGHT AUTOMOTIVE SETS

NOS. 2-S AND 2½-S

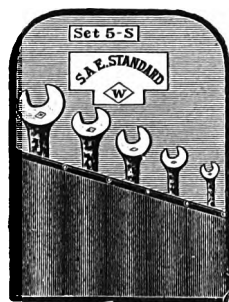


"S.A.E. LIGHT FIVE"
FIG. 382

Number	For S. A. E. Standard Nuts and Cap Screws	For U. S. Standard Nuts	For Cap Screws	Openings Milled	Ex-treme Length	Thick-ness Heads	PRICE		
							Un-finished	Semi-finished	Finished
677S	1/4 & 5/16	.. 1/4	1/4 & 5/16	7/16 & 1/2	7 1/4	5/16	\$0.23	\$0.34	\$0.47
679S	3/8 & 7/16	.. ..	3/8 & 7/16	1/2 & 5/8	8 1/4	3/8	.29	.43	.58
681A	1/2 & 9/16	.. 1/2	1/2 & 9/16	5/8 & 3/4	9 1/4	1/2	.38	.55	.72
683A	5/8 & 11/16	.. ..	5/8 & 11/16	3/4 & 1	10 3/8	5/8	.50	.70	.90
685C	3/4 & 7/8	5/8 & 3/4	.. 1	1 1/16 & 1 1/4	12	3/4	.70	1.00	1.30
No. 2-S	Set	List Price of Roll, \$0.45 extra					\$2.10	\$3.02	\$3.97
No. 2½-S	Set	Same as 2-S, but without Wrench No. 685C					1.40	2.02	2.67

STANDARD AUTOMOTIVE SET

NOS. 5-S AND 5½-S

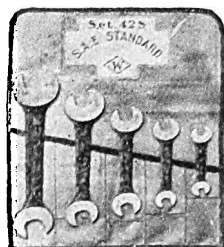


"S.A.E."—FIG. 370

Number	For S. A. E. Standard Nuts and Cap Screws	For U. S. Standard Nuts	For Cap Screws	Openings Milled	Ex-treme Length	Thick-ness Heads	PRICE		
							Un-finished	Semi-finished	Finished
725	1/4 & 5/16	.. 1/4	1/4 & 5/16	7/16 & 1/2	4 7/8	5/16	\$0.17	\$0.25	\$0.38
727	3/8 & 7/16	.. ..	3/8 & 7/16	1/2 & 5/8	5 7/8	3/8	.21	.31	.46
731A	1/2 & 9/16	.. 1/2	1/2 & 9/16	5/8 & 3/4	7 3/4	1/2	.30	.45	.68
33C	5/8 & 11/16	.. ..	5/8 & 11/16	3/4 & 1	8 3/4	5/8	.37	.55	.85
37	3/4 & 7/8	5/8 & 3/4	.. 1	1 1/16 & 1 1/4	11 1/2	3/4	.66	.96	1.40
No. 5-S	Set	List Price of Roll, \$0.45 extra					\$1.71	\$2.52	\$3.77
No. 5½-S	Set	Same as 5-S, but without Wrench No. 37.					1.05	1.56	2.37

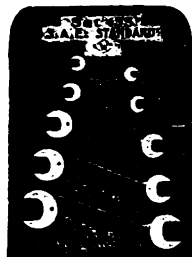
"THIN" AUTOMOTIVE SETS

NOS. 42-S AND 42½-S FOR LIGHT WORK ONLY



"THIN"
FIG. 3900

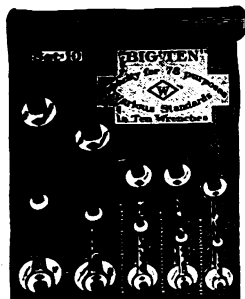
No.	For S.A.E. Standard Nuts and Cap Screws	For U.S. Standard Nuts	For Cap Screws	Openings Milled	Extreme Length	Thickness Heads	PRICE		
							Unfin-ished	Semi-finished	Finished
623D	1/4 & 5/16	.. 1/4	1/4 & 5/16	7/16 & 1/2	4 3/8	5/16 & 3/8	\$0.17	\$0.25	\$0.38
626S	3/8 & 7/16	.. ..	3/8 & 7/16	1/2 & 5/8	5 1/2	3/8 & 1/2	.22	.32	.48
629E	1/2 & 9/16	.. 1/2	1/2 & 9/16	5/8 & 3/4	6 7/8	1/2 & 5/8	.28	.40	.60
632X	5/8 & 11/16	.. ..	5/8 & 11/16	3/4 & 1	8 1/2	5/8 & 3/4	.40	.56	.80
637	3/4 & 7/8	5/8 & 3/4	.. 1	1 1/16 & 1 1/4	10 3/8	3/4 & 7/8	.60	.84	1.15
42-S	Set	List Price of Roll, \$0.45 extra					\$1.67	\$2.37	\$3.41
42½-S	Set	Same as 42-S, but without Wrench No. 637					1.07	1.53	2.26

WILLIAMS SUPERIOR DROP-FORGED WRENCH SETS**AUTOMOTIVE SETS, 22½° ANGLE****NOS. 45-S AND 45½-S****22½° ANGLE—FIG. 3901**

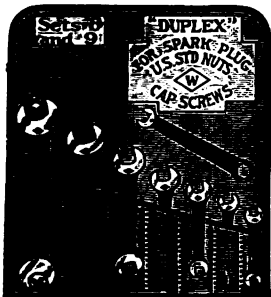
No.	For S.A.E. Standard Nuts and Cap Screws	For U.S. Standard Nuts	For Cap Screws	Openings Milled	Extreme Length	Thickness Heads	PRICE		
							Un-finished	Semi-finished	Finished
760Y	¼ & ⅝	.. ¼	¼ & ⅝	⅞ & ½	4¾	¼	\$0.17	\$0.25	\$0.38
761Z	⅜ & ⅞	.. ½	⅜ & ⅞	⅞ & ⅝	5¾	⅝	.21	.31	.46
763Y	½ & ⅞	.. ¾	½ & ⅞	¾ & ⅞	8¼	⅞	.36	.53	.78
764Z	⅝ & ⅞	.. ¾	.. ¾	⅞ & 1	9½	⅞	.50	.72	1.05
765A	¾ & ⅞	⅝ & ¾	.. 1	1⅞ & 1¼	11	⅞	.68	.96	1.40
45-S	Set List Price of Roll, \$0.45 extra						\$1.92	\$2.77	\$4.07
45½-S	Set Same as 45-S, but without Wrench No. 765A						1.24	1.81	2.67

AUTOMOTIVE "EXTRA CAPACITY" SETS**NOS. 4 AND 7—FOR SEVERE AUTOMOTIVE SERVICE. NO DUPLICATION OF OPENINGS.****"BIG SEVEN"—FIG. 373**

No.	S. A. E. Standard Nuts and Cap Screws	For U. S. Std. Nuts; Size Bolts	For Cap Screws; Diam. Screws	Openings Milled	Ex-treme Length	PRICE		
						Un-finished	Semi-finished	Finished
725	¼ & ⅝	.. ¼	¼ & ⅝	⅞ & ½	4¾	\$0.17	\$0.25	\$0.38
27C	⅜ ..	.. ⅜	⅜ ..	⅞ & ⅝	5⅞	.21	.31	.46
28	..	⅞ & ⅞	..	⅞ & ⅞	6⅞	.25	.37	.56
729	⅞ & ½	.. ½	⅞ & ½	⅞ & ⅝	6⅞	.25	.37	.56
34	⅞ & ¾	½ & ⅝	⅞ ..	⅞ & ⅞	9¾	.46	.68	1.08
736	⅞ & ⅞	.. ¾	¾ & 1	1 & 1¼	11½	.66	.96	1.40
993	¾ & ⅞	.. ..	.. ..	⅞ & ⅞	8	.40	.58	.85
No. 7	Set List Price of Roll, \$0.45 extra					\$2.40	\$3.52	\$5.29
No. 4	Set Same as 7, but without Spark Plug Wrench No. 993					2.00	2.94	4.44

"EXTRA CAPACITY" GARAGE SET**"BIG TEN," NO. 10—FOR SEVERE AUTOMOTIVE SERVICE. NO DUPLICATION OF OPENINGS.****"BIG TEN"—FIG. 374**

No.	For U. S. Std. Nuts; Size Bolts	For Cap Screws; Diam. Screws	S. A. E. Standard Nuts and Cap Screws	Openings Milled	Extreme Length	PRICE		
						Un-finished	Semi-finished	Finished
721	⅞ ..	⅞ & ⅞	.. ..	⅞ & ⅞	3½	\$0.12	\$0.17	\$0.26
23	⅞ & ¼	.. ⅞	.. ⅞	⅞ & ½	4	.14	.21	.32
725A	..	¼ & ⅞	¼ & ⅞	⅞ & ⅞	4⅞	.17	.25	.38
27	⅞ & ⅞	.. ..	.. ..	⅞ & ⅞	5⅞	.21	.31	.46
729	.. ½	⅞ & ½	⅞ & ½	⅞ & ⅞	6⅞	.25	.37	.56
731B	.. ⅞	⅞ & ⅞	.. ⅞	⅞ & ⅞	7⅞	.30	.45	.68
32	⅞ & ⅞	.. ..	.. ..	⅞ & ⅞	8¾	.37	.55	.85
33C	.. ¾	.. ¾	⅞ & ⅞	⅞ & ⅞	8¾	.37	.55	.85
737	.. ¾	⅞ & 1	⅞ & ⅞	1 & 1¼	11¼	.66	.96	1.40
38	⅞ & ⅞	.. ..	¾ & 1	1 & 1¼	13½	1.00	1.40	1.90
No. 10	Set List Price of Roll, \$0.60 extra					\$3.59	\$5.22	\$7.66

AUTOMOTIVE SETS "DUPLEX"**NOS. 8 AND 9—WITH OR WITHOUT SPARK PLUG WRENCH—NO DUPLICATION OF OPENINGS****"DUPLEX"—FIG. 371**

No.	For U. S. Std. Nuts; Size Bolts	For Cap Screws; Diam. Screws	Openings Milled	Extreme Length	Thick-ness Heads	PRICE		
						Un-finished	Semi-finished	Finished
725	.. ¼	¼ & ⅞	⅞ & ½	4⅞	⅞	\$0.17	\$0.25	\$0.38
25	¼ & ⅞	⅞ ..	⅞ & ⅞	4⅞	⅞	.17	.25	.38
27C	.. ⅞	⅞ ..	⅞ & ⅞	5⅞	⅞	.21	.31	.46
28S	.. ⅞	⅞ ..	⅞ & ⅞	6⅞	⅞	.25	.37	.56
731A	.. ½	⅞ & ⅞	¾ & ⅞	7¾	⅞	.30	.45	.68
34	½ & ⅞	⅞ ..	⅞ & 1	9¾	⅞	.46	.68	1.08
736	.. ¾	¾ & 1	1 & 1¼	11½	⅞	.66	.96	1.40
993	.. ..	.. ..	⅞ & ⅞	8	⅞ & ½	.40	.58	.85
No. 8	Set—List Price of Roll, \$0.45 extra					\$2.62	\$3.85	\$5.79
No. 9	Set—Same as 8, without Spark Plug Wrench No. 993					2.22	3.27	4.94

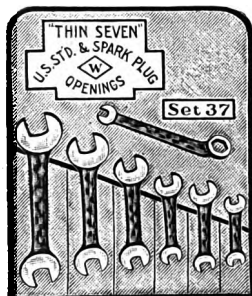
WILLIAMS SUPERIOR DROP-FORGED WRENCH SETS

For comparative list of catalogue numbers used by manufacturers of drop-forged wrenches, see page 120.

AUTOMOTIVE SETS, "THIN"

NOS. 34 AND 37—FOR LIGHT WORK ONLY. WITH OR WITHOUT SPARK PLUG WRENCH.

NO DUPLICATION OF OPENINGS



"THIN SEVEN"—FIG. 377

Number	For U. S. Std. Nuts; Size Bolts	For Cap Screws; Diam. Screws	Openings Milled	Extreme Length	Thickness Heads	PRICE		
						Un-finished	Semi-finished	Finished
623D	.. 1/4	1/4 & 1/8	1/8 & 1/2	4 3/8	1/4 & 1/2	\$0.17	\$0.25	\$0.38
626X	.. 3/8	3/8 ..	1/8 & 1/2	5 1/2	1/4 & 1/2	.22	.32	.48
628	1/8 & 1/4	..	1/8 & 1/2	5 1/2	1/4 & 1/2	.22	.32	.48
629D	.. 1/2	1/2 & 1/2	5/8 & 3/4	6 7/8	1/4 & 1/2	.28	.40	.60
634	1/2 & 5/8	5/8 ..	7/8 & 1 1/8	8 1/2	1/4 & 1/2	.40	.56	.80
635E	.. 3/4	3/4 & 1	1 & 1 1/4	10 3/8	1/4 & 1/2	.60	.84	1.15
993	..	..	1 1/8 & 1 1/2	8	1/4 & 1/2	.40	.58	.85
No. 37	Set	List Price of Roll, \$0.45 extra				\$2.29	\$3.27	\$4.74
No. 34	Set same as 37, but without Spark Plug. Wrench No. 993.					1.89	2.69	3.89

LIGHT SERVICE SET

"LIGHT" NO. 1



"LIGHT"
FIG. 379

Number	For Manufacturers' Standard Nuts; Size Bolts	Openings Milled	Extreme Length	Thickness Heads	PRICE		
					Un-finished	Semi-finished	Finished
675	1/8 & 1/4	1/8 & 1/2	6 1/4	1/4	\$0.18	\$0.27	\$0.38
677	1/4 & 1/2	1/2 & 5/8	7 1/4	1/4	.23	.34	.47
679	1/4 & 3/8	5/8 & 1 1/8	8 1/4	1/4	.29	.43	.58
681	3/8 & 1/2	1 1/8 & 1 1/2	9 1/4	5/8	.38	.55	.72
683	1/2 & 1	1 1/2 & 1 3/4	10 3/8	1 1/8	.50	.70	.90
No. 1	Set	List Price of Roll, \$0.45 extra			\$1.58	\$2.29	\$3.05

"UTILITY THREE" SET

NOS. 21 AND 26



"UTILITY THREE"
FIG. 389

Number	For Manufacturers' Std. Nuts; Size Bolts	Openings Milled	Extreme Length	Thickness Heads	PRICE		
					Unfinished	Semi-finished	Finished
675	1/8 & 1/4	1/8 & 1/2	6 1/4	1/4	\$0.18	\$0.27	\$0.38
679	1/4 & 3/8	5/8 & 1 1/8	8 1/4	1/4	.29	.43	.58
683	1/2 & 1	1 1/2 & 1 3/4	10 3/8	1 1/8	.50	.70	.90
No. 21	Set	List Price of Roll, \$0.35 extra			\$0.97	\$1.40	\$1.86
675A	..	3/8 & 1/2	6 1/4	1/4	\$0.18	\$0.27	\$0.38
679C	..	5/8 & 3/4	8 1/4	1/4	.29	.43	.58
683B	..	1 1/8 & 1	10 3/8	1 1/8	.50	.70	.90
No. 26	Set	List Price of Roll, \$0.35 extra			\$0.97	\$1.40	\$1.86

GENERAL SERVICE SET

NO. 3, "LIGHT"



GENERAL SERVICE
FIG. 381

Number	For Unclassified Nuts or Screws	Openings Milled	Extreme Length	Thickness Heads	PRICE		
					Un-finished	Semi-finished	Finished
675B	Twelve	3/8 & 1/2	6 1/4	1/4	\$0.18	\$0.27	\$0.38
677B	Popular	1/2 & 5/8	7 1/4	1/4	.23	.34	.47
679	Milled	5/8 & 1 1/8	8 1/4	1/4	.29	.43	.58
681B	Openings—	3/4 & 1 1/8	9 1/4	5/8	.38	.55	.72
683B	No	1 1/8 & 1	10 3/8	1 1/8	.50	.70	.90
685B	Duplicates	1 1/8 & 1 1/4	12	1 1/2	.70	1.00	1.30
No. 3	Set	List Price of Roll, \$0.45 extra			\$2.28	\$3.29	\$4.35

WILLIAMS SUPERIOR DROP-FORGED WRENCH SETS

"UTILITY FIVE" SET

NO. 6



"UTILITY FIVE"
FIG. 383

Number	Openings Milled	Extreme Length	Thickness Heads	PRICE		
				Un-finished	Semi-finished	Finished
675A	$\frac{3}{8}$ & $\frac{1}{2}$	6 $\frac{1}{4}$	$\frac{1}{4}$	\$0.18	\$0.27	\$0.38
677	$\frac{1}{2}$ & $\frac{5}{8}$	7 $\frac{1}{4}$	$\frac{3}{8}$	.23	.34	.47
679C	$\frac{5}{8}$ & $\frac{3}{4}$	8 $\frac{1}{4}$	$\frac{1}{2}$	.29	.43	.58
681A	$\frac{3}{4}$ & $\frac{7}{8}$	9 $\frac{1}{4}$	$\frac{3}{8}$	.38	.55	.72
683B	$\frac{7}{8}$ & 1	10 $\frac{3}{8}$	$\frac{1}{2}$	.50	.70	.90
No. 6	Set	List Price of Roll, \$0.45 extra		\$1.58	\$2.29	\$ 3.05

AUTOMOTIVE TAPPET WRENCH SET

NO. 50—FOR SERVICE IN ADJUSTING VALVE TAPPETS IN GAS ENGINES

The Check Nut or "Thin" Wrenches comprising this Set render it particularly efficient in adjusting valve tappets. The openings are of the correct size to care for the tappets in the great majority of popular motors; all garage men, repair men and owners making such adjustments find the "Tappet Set" a great convenience and an invaluable time-saver for this work.

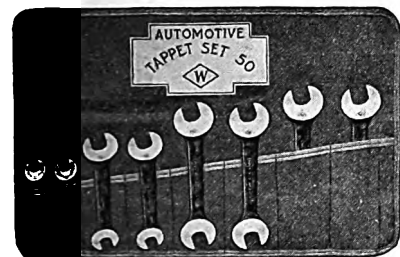
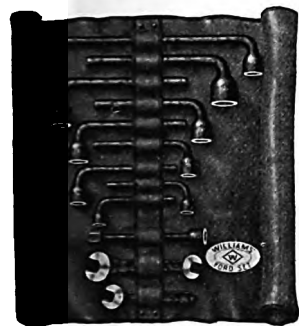


FIG. 3902

No.	Openings Milled	For S. A. E. Std. Nuts and Cap Screws	For U. S. Std. Nuts	For Cap Screws	PRICE		
					Un-finished	Semi-finished	Finished
623T	$\frac{3}{8}$ & $\frac{7}{16}$	.. $\frac{1}{4}$	..	$\frac{3}{16}$ & $\frac{1}{4}$	\$0.17	\$0.25	\$0.38
623T	$\frac{2}{8}$ & $\frac{1}{8}$	.. $\frac{1}{4}$	..	$\frac{3}{16}$ & $\frac{1}{4}$	.17	.25	.38
626T	$\frac{1}{2}$ & $\frac{9}{16}$	$\frac{1}{8}$ & $\frac{3}{8}$	$\frac{1}{4}$	$\frac{1}{8}$ & $\frac{3}{8}$	.22	.32	.48
626T	$\frac{1}{2}$ & $\frac{9}{16}$	$\frac{1}{8}$ & $\frac{3}{8}$	$\frac{1}{4}$	$\frac{1}{8}$ & $\frac{3}{8}$	.22	.32	.48
629T	$\frac{5}{8}$ & $\frac{11}{16}$	$\frac{1}{8}$..	$\frac{3}{8}$	$\frac{1}{8}$..	.28	.40	.60
629T	$\frac{5}{8}$ & $\frac{11}{16}$	$\frac{1}{8}$..	$\frac{3}{8}$	$\frac{1}{8}$..	.28	.40	.60
629E	$\frac{3}{4}$ & $\frac{7}{8}$	$\frac{1}{2}$ & $\frac{9}{16}$	$\frac{1}{2}$	$\frac{1}{2}$ & $\frac{5}{8}$	.28	.40	.60
629E	$\frac{3}{4}$ & $\frac{7}{8}$	$\frac{1}{2}$ & $\frac{9}{16}$	$\frac{1}{2}$	$\frac{1}{2}$ & $\frac{5}{8}$	.28	.40	.60
No. 50	Set	List Price of Roll, \$0.75 extra			\$1.90	\$2.74	\$4.12

"FORD" SETS

SET "A"

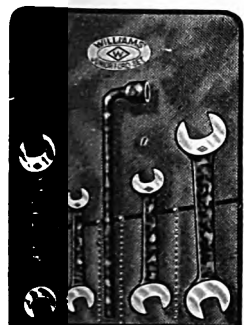


"FORD" SET "A"
FIG. 385

Number	Class	Opening, Size Across Flats	Extreme Length	PRICE		
				Un-finished	Semi-finished	Finished
27	D. H. Engineers'	$\frac{11}{16}$ & $\frac{11}{16}$	5 $\frac{7}{8}$	\$0.21	\$0.31	\$0.46
702	S. H. Cap Screw	$\frac{11}{16}$	4 $\frac{3}{4}$	.15	.22	.32
263D	Offset Socket	$\frac{11}{16}$	4 $\frac{1}{4}$	.24	.36	.48
264A	Offset Socket	$\frac{11}{16}$	5 $\frac{1}{8}$	.26	.39	.52
*965D	Straight Socket	$\frac{11}{16}$	5 $\frac{7}{8}$	.29	.44	.58
265D	Offset Socket	$\frac{11}{16}$	5 $\frac{7}{8}$	.29	.44	.58
265A	Offset Socket	$\frac{11}{16}$	5 $\frac{7}{8}$	.29	.44	.58
266DS	Offset Socket	$\frac{11}{16}$	11	.42	.63	.84
*267A	Offset Socket	$\frac{11}{16}$	6 $\frac{3}{4}$	.36	.54	.72
267D	Offset Socket	$\frac{11}{16}$	6 $\frac{3}{4}$	.36	.54	.72
268A	Offset Socket	$\frac{11}{16}$	7 $\frac{1}{2}$	.40	.60	.80
269A	Offset Socket	$\frac{11}{16}$	8 $\frac{3}{8}$	.46	.69	.92
"Ford" Set "A"	List Price of Roll, \$0.60 extra			\$3.73	\$5.60	\$7.52

*Use Wrench No. 267A as lever for Wrench No. 965 D.

SET "B"



"FORD" SET "B"
FIG. 386

Number	Class	Opening, Size Across Flats	Extreme Length	PRICE		
				Un-finished	Semi-finished	Finished
27C	D. H. Engineers'	$\frac{11}{16}$ & $\frac{11}{16}$	5 $\frac{7}{8}$	\$0.21	\$0.31	\$0.46
729	D. H. Cap Screw	$\frac{11}{16}$ & $\frac{3}{4}$	6 $\frac{7}{8}$	.25	.37	.56
33C	D. H. Engineers'	$\frac{11}{16}$ & 1	8 $\frac{3}{4}$	.37	.55	.85
734	D. H. Cap Screw	$\frac{7}{8}$ & 1 $\frac{1}{8}$	9 $\frac{3}{4}$	.46	.68	1.08
266DS	Offset Socket	$\frac{11}{16}$	11	.42	.63	.84
"Ford" Set "B"	List Price of Roll, \$0.45 extra			\$1.71	\$2.54	\$3.79

BILLINGS & SPENCER WRENCH SETS**"CHECK NUT" OR "THIN"****NO. 14 FOR A. L. A. M. STANDARD NUTS AND CAP SCREWS**

FIG. 3903

No.	A.L.A.M. Std. Nuts and Cap Screws—Size Bolt or Screw	Milled Openings	Length	Thickness of Heads	PRICE	
					Semi-Finished	Finished
1350W	$\frac{1}{4}-\frac{5}{16}$	$\frac{3}{8}-\frac{1}{2}$	$4\frac{1}{2}$	$\frac{5}{32}$	\$0.25	\$0.38
1353W	$\frac{3}{8}-\frac{1}{2}$	$\frac{9}{16}-\frac{11}{16}$	$5\frac{1}{2}$	$\frac{1}{16}$	.32	.48
1356W	$\frac{1}{2}-\frac{1}{2}$	$\frac{3}{4}-\frac{7}{8}$	7	$\frac{3}{32}$	.40	.60
1359W	$\frac{5}{8}-\frac{1}{2}$	$\frac{1}{2}-1$	$8\frac{1}{2}$	$\frac{1}{4}$	.56	.80
1362W	$\frac{3}{4}-\frac{7}{8}$	$1\frac{1}{8}-1\frac{1}{4}$	$10\frac{1}{2}$	$\frac{9}{32}$	.84	1.15
No. 14	Set				\$2.37	\$3.41

List Price of Bag \$0.45 extra.

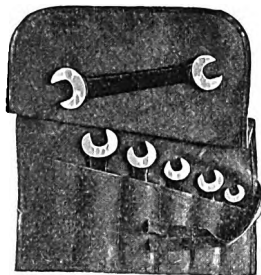
"CHECK NUT" OR "THIN"**NO. 17 FOR U. S. STANDARD NUTS AND CAP SCREWS**

FIG. 3904

No.	Size of Screw	Milled Openings	Length	Thickness of Head	PRICES		
					Unfinished	Semi-Finished	Full Finished
1351W	$\frac{1}{4}-\frac{5}{16}$	$\frac{7}{16}-\frac{1}{2}$	$4\frac{1}{2}$	$\frac{5}{32}$	\$0.17	\$0.25	\$0.38
1353W	$\frac{3}{8}-\frac{1}{2}$	$\frac{9}{16}-\frac{11}{16}$	$5\frac{1}{2}$	$\frac{1}{16}$	.22	.32	.48
1355	$\frac{1}{2}-\frac{1}{2}$	$\frac{3}{4}-\frac{7}{8}$	$5\frac{1}{2}$	$\frac{3}{32}$	.22	.32	.48
1357W	$\frac{5}{8}-\frac{1}{2}$	$\frac{5}{8}-\frac{3}{4}$	7	$\frac{1}{32}$	.28	.40	.60
1361	$\frac{3}{8}-\frac{1}{2}$	$\frac{7}{8}-1\frac{1}{16}$	$8\frac{1}{2}$	$\frac{1}{4}$	.40	.56	.80
1363W	$\frac{3}{4}-1$	$1-1\frac{1}{4}$	$10\frac{1}{2}$	$\frac{9}{32}$	.60	.84	1.15
No. 17	Set				\$1.89	\$2.69	\$3.89

List Price of Bag \$0.60 Extra.

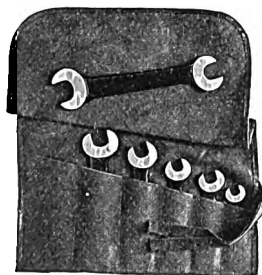
HEXAGON HEAD CAP SCREWS**NO. 17½ FOR A. L. A. M. AND S. A. E. STANDARD NUTS**

FIG. 3905

No.	Hex. Head Cap Screw	A.L.A.M. Std. Nut & Cap Screws Size Bolt or Screw	S.A.E. Std. Nut and Cap Screws Size Bolt or Screw	Milled Openings	Length	Thickness of Head	PRICES		
							Unfinished	Semi-Finished	Full Finished
1325	$\frac{3}{8}-\frac{1}{4}$	$\frac{1}{4}$	$\frac{1}{4}$	$\frac{3}{8}-\frac{7}{16}$	$4\frac{1}{2}$	$\frac{5}{32}$	\$0.17	\$0.25	\$0.38
1326	$\frac{1}{4}-\frac{5}{16}$	$\frac{3}{8}$	$\frac{1}{4}$	$\frac{1}{8}-\frac{1}{2}$	$4\frac{1}{2}$	$\frac{3}{32}$	.17	.25	.38
1327	$\frac{5}{16}-\frac{3}{8}$	$\frac{5}{8}-\frac{3}{8}$	$\frac{3}{8}-\frac{3}{8}$	$\frac{1}{2}-\frac{9}{16}$	$4\frac{1}{2}$	$\frac{3}{32}$	.17	.25	.38
1328	$\frac{3}{8}-\frac{1}{2}$	$\frac{3}{8}$	$\frac{3}{8}$	$\frac{5}{8}-\frac{1}{2}$	$5\frac{1}{2}$	$\frac{1}{16}$	.22	.32	.48
1329	$\frac{1}{2}-\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{3}{4}-\frac{1}{2}$	$5\frac{1}{2}$	$\frac{1}{16}$	.22	.32	.48
1330	$\frac{1}{2}-\frac{5}{8}$	$\frac{1}{2}-\frac{9}{16}$	$\frac{1}{2}-\frac{9}{16}$	$\frac{3}{4}-\frac{7}{8}$	7	$\frac{1}{32}$	.28	.40	.60
17½	Set						\$1.23	\$1.79	\$2.70

List Price of Bag \$0.60 Extra.

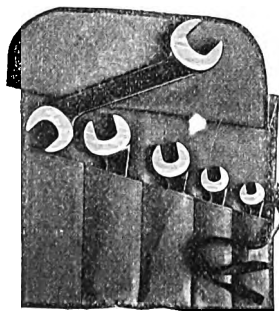
TEXTILE TYPE AUTO SET**NO. 18 FOR S. A. E. AND U. S. STANDARD CAP SCREWS**

FIG. 3906

No.	Size of Screw	Milled Openings	Length	Thickness of Head	PRICES		
					Unfinished	Semi-Finished	Full Finished
1557	$\frac{1}{4}-\frac{5}{16}$	$\frac{7}{16}-\frac{1}{2}$	$4\frac{3}{4}$	$\frac{1}{4}$	\$0.17	\$0.25	\$0.38
1562	$\frac{3}{8}-\frac{1}{2}$	$\frac{9}{16}-\frac{5}{8}$	$5\frac{3}{4}$	$\frac{1}{16}$	.21	.31	.46
1569	$\frac{1}{2}-\frac{5}{8}$	$\frac{3}{4}-\frac{7}{8}$	7	$\frac{3}{32}$	.27	.40	.60
1575S	$\frac{1}{2}-1$	$\frac{1}{2}-1$	$9\frac{1}{2}$	$\frac{1}{16}$	.50	.72	1.05
1580	1	$1\frac{1}{16}-1\frac{1}{4}$	11	$\frac{1}{2}$	.68	.96	1.40
No. 18	Set				\$1.83	\$2.64	\$3.89

List Price of Bag \$0.45 Extra.

BILLINGS & SPENCER WRENCH SETS**TEXTILE SET**

NO. 19 WITH OPENINGS FOR U. S. STANDARD NUTS, BOLT SIZES FROM 3-16 TO 7-8



FIG. 3907

No.	U. S. Bolt Sizes	Milled Openings	Length	Thickness of Head	PRICES		
					Unfinished	Semi-Finished	Full Finished
1555	$\frac{3}{16}$ - $\frac{1}{4}$	$\frac{13}{32}$ - $\frac{1}{2}$	$4\frac{3}{4}$	$\frac{1}{4}$	\$0.17	\$0.25	\$0.38
1564	$\frac{5}{16}$ - $\frac{3}{8}$	$\frac{15}{32}$ - $\frac{11}{16}$	$5\frac{3}{4}$	$\frac{5}{16}$	.21	.31	.46
1571	$\frac{7}{16}$ - $\frac{1}{2}$	$\frac{17}{32}$ - $\frac{1}{8}$	$8\frac{1}{4}$	$\frac{3}{8}$	.36	.53	.78
1578	$\frac{9}{16}$ - $\frac{5}{8}$	$\frac{19}{32}$ - $1\frac{1}{16}$	$9\frac{1}{2}$	$\frac{7}{16}$	.50	.72	1.05
1583	$\frac{3}{4}$ - $\frac{7}{8}$	$1\frac{1}{4}$ - $1\frac{1}{8}$	11	$\frac{1}{2}$	.68	.96	1.40
No. 19	Set				\$1.92	\$2.77	\$4.07

List Price of Bag \$0.45 Extra.

TEXTILE AND LOOM REPAIR SET

NO. 20 FOR U. S. STANDARD NUTS



FIG. 3908

No.	U. S. Bolt Size	Milled Openings	Length	Thickness of Head	PRICES		
					Unfinished	Semi-Finished	Full Finished
1555	$\frac{3}{16}$ - $\frac{1}{4}$	$\frac{13}{32}$ - $\frac{1}{2}$	$4\frac{3}{4}$	$\frac{1}{4}$	\$0.17	\$0.25	\$0.38
1564	$\frac{5}{16}$ - $\frac{3}{8}$	$\frac{15}{32}$ - $\frac{11}{16}$	$5\frac{3}{4}$	$\frac{5}{16}$	.21	.31	.46
1567	$\frac{3}{8}$ - $\frac{1}{2}$	$\frac{17}{32}$ - $\frac{1}{8}$	7	$\frac{3}{8}$	.27	.40	.60
1572	$\frac{7}{16}$ - $\frac{9}{16}$	$\frac{19}{32}$ - $\frac{1}{4}$	$8\frac{1}{4}$	$\frac{3}{8}$	.36	.53	.78
1578	$\frac{9}{16}$ - $\frac{5}{8}$	$\frac{21}{32}$ - $1\frac{1}{16}$	$9\frac{1}{2}$	$\frac{7}{16}$	.50	.72	1.05
1581	$\frac{3}{4}$ - $\frac{7}{8}$	$1\frac{1}{8}$ - $1\frac{1}{16}$	11	$\frac{1}{2}$	.68	.96	1.40
No. 20	Set				\$2.19	\$3.17	\$4.67

List Price of Bag \$0.45 Extra.

SET FOR HEXAGON HEAD CAP SCREWS AND NUTS FOR SAME

NO. 44

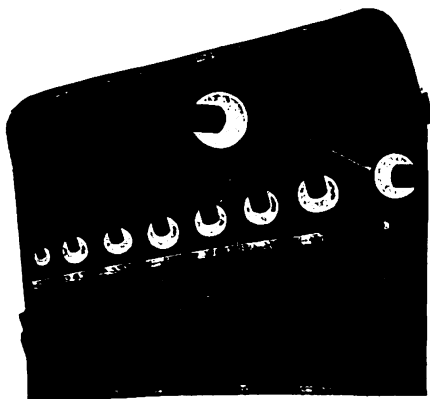


FIG. 3909

No.	Size of Screw Inches	Milled Opening Inches	Length Inches	Thickness of Head Inches	PRICES		
					Unfinished	Semi-Finished	Finished
1557 Cap	$\frac{1}{4}$ - $\frac{5}{16}$	$\frac{7}{16}$ - $\frac{1}{2}$	$4\frac{3}{4}$	$\frac{1}{4}$	\$0.17	\$0.25	\$0.38
1562 Cap	$\frac{3}{8}$ - $\frac{1}{2}$	$\frac{9}{16}$ - $\frac{5}{8}$	$5\frac{3}{4}$	$\frac{5}{16}$	.21	.31	.46
1568 Cap	$\frac{1}{2}$ - $\frac{3}{4}$	$\frac{11}{16}$ - $\frac{3}{4}$	7	$\frac{3}{8}$	.27	.40	.60
1575 Cap	$\frac{5}{8}$ - $\frac{3}{4}$	$\frac{13}{16}$ - 1	$9\frac{1}{2}$	$\frac{7}{16}$	.50	.72	1.05
1559 Nut	$\frac{1}{4}$ - $\frac{5}{16}$	$\frac{1}{2}$ - $\frac{13}{32}$	$5\frac{3}{4}$	$\frac{5}{16}$	.21	.31	.46
1566 Nut	$\frac{3}{8}$ - $\frac{1}{2}$	$\frac{11}{16}$ - $\frac{3}{4}$	7	$\frac{3}{8}$	.27	.40	.60
1574 Nut	$\frac{1}{2}$ - $\frac{3}{4}$	$\frac{13}{16}$ - $\frac{3}{4}$	$8\frac{1}{4}$	$\frac{7}{16}$	.36	.53	.78
1580 Nut	$\frac{5}{8}$ - $\frac{3}{4}$	$1\frac{1}{16}$ - $1\frac{1}{4}$	11	$\frac{1}{2}$	.68	.96	1.40
No. 44	Set				\$2.67	\$3.88	\$5.73

List Price of Bag \$0.70 Extra.

WILLIAMS DROP-FORGED SPANNER WRENCHES

PIN SPANNERS



FIG. 416

A comparative list of catalogue numbers used by manufacturers of drop forged wrenches.

Armstrong Numbers.....	452	453	454	455	456	457	458	459
Williams Numbers.....	452	453	454	455	456	457	458	459
Billings & Spencer Numbers				1		2		
Armstrong Numbers.....	460	461	462	463	464	466	468	
Williams Numbers.....	460	461	462	463	464	466	468	
Billings & Spencer Numbers	3				4			

Number	For Circle; Diameter	Extreme Length	Finished Diameter Pin	PRICE		
				Un-finished	Semi-finished	Finished
452	1	4	$\frac{1}{16}$	\$0.18	\$0.27	\$0.36
453	$1\frac{1}{4}$	$4\frac{1}{2}$	$\frac{1}{8}$	.19	.29	.38
454	$1\frac{1}{2}$	5	$\frac{3}{16}$	.20	.30	.40
455	$1\frac{3}{4}$	$5\frac{1}{2}$	$\frac{1}{4}$	.21	.31	.42
456	2	6	$\frac{1}{4}$	.22	.33	.44
457	$2\frac{1}{4}$	$6\frac{1}{2}$	$\frac{3}{8}$	.23	.35	.46
458	$2\frac{1}{2}$	7	$\frac{3}{8}$	.24	.36	.48
459	$2\frac{3}{4}$	$7\frac{1}{2}$	$\frac{1}{2}$	.26	.39	.52
460	3	8	$\frac{1}{2}$	.28	.42	.56
461	$3\frac{1}{4}$	$8\frac{1}{2}$	$\frac{3}{4}$	.30	.45	.60
462	$3\frac{1}{2}$	9	$\frac{3}{4}$	.32	.48	.64
463	$3\frac{3}{4}$	$9\frac{1}{2}$	$\frac{1}{2}$	.34	.51	.68
464	4	10	$\frac{3}{8}$	.36	.54	.72
466	5	12	$\frac{1}{2}$	.48	.72	.96
468	6	14	$\frac{1}{2}$	.65	.98	1.30

FACE SPANNERS

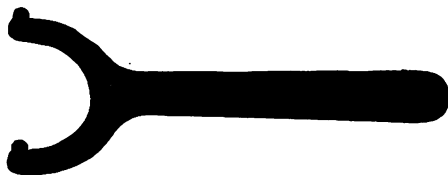


FIG. 415

No.	Pins			Span of Jaws in Clear	Length from C. of Pins	Thick-ness	PRICE		
	Distance C to C	Diam. Milled	Length				Un-finished	Semi-finished	Finished
418	1	$\frac{1}{16}$	$\frac{1}{16}$	$\frac{1}{16}$	$4\frac{1}{2}$	$\frac{1}{16}$	\$0.24	\$0.30	\$0.40
420	$1\frac{1}{4}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	5	$\frac{1}{8}$	.26	.33	.45
422	$1\frac{1}{2}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$5\frac{1}{2}$	$\frac{1}{8}$	.29	.37	.50
424	$1\frac{3}{4}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	6	$\frac{1}{8}$	.33	.42	.56
426	2	$\frac{1}{4}$	$\frac{1}{4}$	$\frac{1}{4}$	$6\frac{1}{2}$	$\frac{1}{4}$	.38	.48	.63
428	$2\frac{1}{4}$	$\frac{1}{4}$	$\frac{1}{4}$	$\frac{1}{4}$	7	$\frac{1}{4}$	.44	.55	.72
430	$2\frac{1}{2}$	$\frac{1}{4}$	$\frac{1}{4}$	$\frac{1}{4}$	$7\frac{1}{2}$	$\frac{1}{4}$	.51	.64	.82
432	$2\frac{3}{4}$	$\frac{1}{4}$	$\frac{1}{4}$	$\frac{1}{4}$	8	$\frac{1}{4}$	.59	.74	.94
434	3	$\frac{5}{16}$	$\frac{5}{16}$	$\frac{5}{16}$	$8\frac{1}{2}$	$\frac{1}{4}$	.68	.85	1.08
436	$3\frac{1}{4}$	$\frac{3}{8}$	$\frac{3}{8}$	$\frac{3}{8}$	$9\frac{1}{4}$	$\frac{1}{4}$	.78	.97	1.24
438	$3\frac{1}{2}$	$\frac{3}{8}$	$\frac{3}{8}$	$\frac{3}{8}$	$9\frac{3}{4}$	$\frac{1}{4}$	.88	1.10	1.40
440	$3\frac{3}{4}$	$\frac{3}{8}$	$\frac{3}{8}$	$\frac{3}{8}$	$10\frac{3}{8}$	$\frac{1}{4}$	1.00	1.25	1.60
442	4	$\frac{3}{8}$	$\frac{3}{8}$	$\frac{3}{8}$	11	$\frac{1}{4}$	1.15	1.45	1.85

HOOK SPANNERS

UNFINISHED ONLY



FIG. 417

The diameter of circle which the unfinished forgings fit is given in second column of table, but wrenches will finish to sizes stated in third column.

Number	Forgings for Circle; Diameter	Forgings will finish for Circles; Diameter	Extreme Length	Thick-ness	Price each
403	$1\frac{1}{4}$	1 to $1\frac{1}{4}$	$4\frac{3}{4}$	$\frac{1}{16}$	\$0.20
404	$1\frac{1}{2}$	$1\frac{3}{8}$ to $1\frac{1}{2}$	6	$\frac{1}{16}$	.23
405	2	$1\frac{3}{4}$ to 2	$7\frac{1}{8}$	$\frac{1}{16}$	.26
406	$2\frac{1}{4}$	$2\frac{1}{8}$ to $2\frac{3}{8}$	$8\frac{1}{8}$	$\frac{1}{16}$	.30
407	$2\frac{5}{8}$	$2\frac{1}{2}$ to $2\frac{3}{4}$	$9\frac{3}{4}$	$\frac{1}{16}$	.34
408	$3\frac{1}{8}$	$2\frac{7}{8}$ to $3\frac{1}{4}$	11	$\frac{1}{16}$	.40
409	$3\frac{3}{8}$	$3\frac{3}{8}$ to $3\frac{7}{8}$	12	$\frac{1}{16}$	.48
410	$4\frac{3}{8}$	4 to $4\frac{1}{2}$	13	$\frac{1}{16}$	.58
412	$5\frac{3}{4}$	$5\frac{1}{4}$ to $5\frac{3}{4}$	15	$\frac{1}{16}$	.85

BILLINGS & SPENCER AUTO SPANNER

No.	Takes Circles	Diameter of Pin	Length of Pin	Length Wrench	Price Each
0	$\frac{3}{4}$ to 2 in.	$\frac{3}{16}$ in.	$\frac{1}{8}$ in.	7 in.	\$0.70
1	2 to 4 in.	$\frac{1}{4}$ in.	$\frac{1}{4}$ in.	9 in.	.75
2	2 to 4 in.	$\frac{1}{4}$ in.	$\frac{1}{4}$ in.	9 in.	.85



FIG. 418

Adjustable, Drop Forged, Made of best Steel for this purpose, Case Hardened, this is one of the best wrenches for this use.

SINGLE HEAD SOCKET WRENCHES

A comparative list of catalogue numbers used by manufacturers of drop-forged wrenches.

SINGLE HEAD STRAIGHT PATTERN SQUARE

Armstrong Numbers.....	960-H	961-H	961-J	962-H	964-H	965-H	966-H	967-H	967-X	968-H	968-M	969-H	970-X
Williams Numbers.....	960-H	961-H	961-J	962-H	963-H	965-H	966-H	967-H	967-X	968-H	968-P	969-H	970-X
Billings & Spencer Numbers	720-J	721-J	721-K	722-J	723-J	724-J	725-J	725-K	726-J	726-K	726-L	727-J	727-K

Armstrong Numbers.....	971-H	972-X	973-H	974-X	974-H	976-H	977-M	977-X	977-O	978-M	979-X	980-X	
Williams Numbers.....	971-H	971-X	973-H	974-X	974-H	976-H	977-N	977-X	977-P	978-P	979-X	980-X	
Billings & Spencer Numbers	728-J	729-J	729-K	729-L	730-J	730-K	731-J	731-K	732-J	732-K	733-J	733-K	

SINGLE HEAD OFFSET PATTERN SQUARE

Armstrong Numbers.....	861-H	861-J	862-H	864-H	865-H	866-H	867-H	867-X	868-H	868-M	869-H	870-X	871-H
Williams Old Numbers.....	961-H	961-J	962-H	963-H	965-H	966-H	967-H	967-X	968-H	968-P	969-H	970-X	971-H
Williams New Numbers....	261-H	261-J	262-H	263-H	265-H	266-H	267-H	267-X	268-H	268-P	269-H	270-X	271-H
Billings & Spencer Numbers	821-J	821-K	822-J	823-J	824-J	825-J	825-K	826-J	826-K	826-L	827-J	827-K	828-J

Armstrong Numbers.....	872-X	873-H	874-X	874-H	876-H								
Williams Old Numbers.....	971-X	973-H	974-X	974-H	976-H								
Williams New Numbers....	271-X	273-H	274-X	274-H	276-H								
Billings & Spencer Numbers	829-J	829-K	829-L	830-J	830-K								

WILLIAMS DROP-FORGED SINGLE HEAD SOCKET WRENCHES

WITH OR WITHOUT PIN-HANDLE FOR SQUARE NUTS, CAP
SCREWS AND SET SCREWS

Unfinished are broached only.
Semi-finished are broached, edges ground and case-hardened all over.
Finished are broached, polished all over, case-hardened and lacquered.
In stock with openings for U. S. Standard dimensions. Special broaching to order in reasonable quantities.

Hexagon end of shank is designed for use in combination with another wrench or with Pin-Handle.

Wrenches of shorter or longer lengths than stated in table can be furnished to order in quantities.

State class of wrenches desired.

UNLESS OTHERWISE SPECIFIED, WRENCHES WITH PIN-HANDLES WILL BE SENT

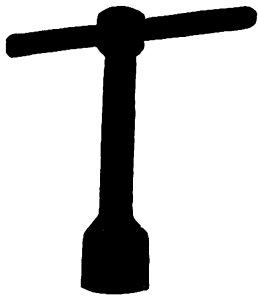


FIG. 390
STRAIGHT PATTERN
WITH PIN-HANDLE



FIG. 391
OFFSET PATTERN

Offset No.	Straight No.	Square Openings				Diam. of Head	Extreme Length		Price					
		For Set Screw; Size	For Cap Screw; Diam. Screw	For U. S. Stand-ard Nut; Size Bolt	Broached Opening				Unfinished		Semi-finished		Finished	
							(1) Either Offset or Straight, no Pin-Handle	With Pin-Handle and Handle Hole	(2) Either Offset or Straight, no Pin-Handle	With Pin-Handle and Handle Hole	(3) Either Offset or Straight, no Pin-Handle	With Pin-Handle and Handle Hole		
260H	960H	$\frac{1}{8}$	...	...	$\frac{1}{8}$	$\frac{3}{4}$	....	\$0.18	\$0.26	\$0.27	\$0.35	\$0.36	\$0.44
261H	961H	$\frac{9}{16}$	...	...	$\frac{1}{2}$	4	....	.20	.30	.30	.40	.40	.50
261J	961J	$\frac{1}{4}$	...	...	$\frac{1}{2}$	4	....	.20	.30	.30	.40	.40	.50
262H	962H	$\frac{5}{16}$	...	...	$\frac{5}{8}$	$4\frac{1}{2}$	$3\frac{7}{8}$	.22	.33	.33	.44	.44	.55
263H	963H	$\frac{3}{8}$	$\frac{1}{4}$	...	$\frac{1}{8}$	$4\frac{7}{8}$	$4\frac{5}{8}$	.24	.37	.36	.49	.48	.61
265H	965H	$\frac{1}{2}$	$\frac{5}{8}$	...	$\frac{1}{8}$	$5\frac{3}{4}$	$5\frac{1}{8}$	.29	.43	.44	.58	.58	.72
266H	966H	$\frac{5}{8}$	$\frac{3}{4}$	$\frac{1}{4}$	1	$6\frac{1}{8}$	$6\frac{1}{4}$	.32	.47	.48	.63	.64	.79
267H	967H	$\frac{3}{4}$	$\frac{7}{8}$	...	$\frac{1}{8}$	$6\frac{1}{2}$	$6\frac{3}{4}$	.36	.53	.54	.71	.72	.89
267X	967X	...	...	$\frac{5}{8}$	$\frac{11}{8}$	$6\frac{1}{2}$	$6\frac{3}{4}$	.36	.53	.54	.71	.72	.89
268H	968H	$\frac{7}{8}$	$\frac{1}{2}$	...	$\frac{1}{4}$	7	$7\frac{1}{2}$	.40	.57	.60	.77	.80	.97
268P	968P	...	...	$\frac{3}{8}$	$\frac{11}{4}$	7	$7\frac{1}{2}$	.40	.57	.60	.77	.80	.97
269H	969H	$\frac{3}{4}$	$\frac{5}{8}$	...	$\frac{1}{8}$	$7\frac{3}{8}$	$8\frac{3}{8}$	.46	.64	.69	.87	.92	1.10
270X	970X	...	...	$\frac{7}{16}$	$\frac{11}{2}$	$7\frac{7}{8}$	$9\frac{1}{8}$	.52	.72	.78	.98	1.04	1.24
271H	971H	$\frac{7}{8}$	$\frac{3}{4}$	$\frac{1}{2}$	$\frac{15}{8}$	$8\frac{1}{4}$	10	.60	.80	.90	1.10	1.20	1.40	
271X	971X	...	...	$\frac{9}{16}$	$\frac{15}{8}$	$8\frac{1}{4}$	10	.60	.80	.90	1.10	1.20	1.40
273H	973H	1	...	...	$\frac{1}{8}$	$9\frac{1}{8}$	$11\frac{5}{8}$	.80	1.10	1.20	1.50	1.60	1.90
274X	974X	...	...	$\frac{5}{8}$	$\frac{1}{4}$	$9\frac{1}{2}$	$12\frac{3}{8}$	.90	1.25	1.35	1.70	1.80	2.15
274H	974H	$1\frac{1}{8}$	$\frac{7}{8}$	...	$\frac{1}{2}$	$9\frac{1}{2}$	$12\frac{3}{8}$	.90	1.25	1.35	1.70	1.80	2.15
276H	976H	$1\frac{1}{4}$	1	$\frac{3}{4}$	$\frac{1}{8}$	$10\frac{3}{8}$	$14\frac{7}{8}$	1.15	1.55	1.72	2.12	2.30	2.70	
277N	977N	...	$1\frac{1}{8}$	...	$\frac{1}{2}$	$10\frac{7}{8}$	$16\frac{1}{2}$	1.30	1.75	1.95	2.40	2.60	3.05
277X	977X	...	...	$\frac{7}{8}$	$\frac{1}{2}$	$10\frac{7}{8}$	$16\frac{1}{2}$	1.30	1.75	1.95	2.40	2.60	3.05
277P	977P	...	$1\frac{1}{4}$	...	$\frac{1}{2}$	$10\frac{7}{8}$	$16\frac{1}{2}$	1.30	1.75	1.95	2.40	2.60	3.05
278P	978P	...	$1\frac{3}{8}$	1	$\frac{1}{2}$	$11\frac{3}{8}$	$18\frac{1}{4}$	1.60	2.05	2.40	2.85	3.20	3.65	
279X	979X	...	...	$1\frac{1}{8}$	$\frac{1}{2}$	$11\frac{7}{8}$	20	2.10	2.60	3.15	3.65	4.20	4.70
280X	980X	...	...	$1\frac{1}{4}$	$\frac{1}{2}$	$12\frac{1}{2}$	$21\frac{3}{4}$	2.80	3.45	4.20	4.85	5.60	6.25

SINGLE HEAD SOCKET WRENCHES

A comparative list of catalogue numbers used by manufacturers of drop-forged wrenches.

SINGLE HEAD STRAIGHT PATTERN HEXAGON

Armstrong Numbers.....	961-A	962-D	963-A	963-D	964-A	965-D	965-A	966-D	967-A	967-D	968-A	968-D
Williams Numbers.....	961-A	962-D	963-A	963-D	964-A	965-D	965-A	966-D	967-A	967-D	968-A	968-D
Billings & Spencer Numbers.....	721-A	722-A	722-B	722-C	723-A	724-A	724-B	725-A	725-B	725-C	726-A	726-B
Armstrong Numbers.....	969-A	970-A	970-D	971-A	972-D	973-A	974-D	975-A	975-D	976-A	977-A	978-A
Williams Numbers.....	969-A	970-A	970-D	971-A	971-D	973-A	974-D	975-A	975-D	976-A	977-A	978-A
Billings & Spencer Numbers.....	726-C	727-A	727-B	728-A	728-B	729-A	730-A	730-B	730-C	731-A	731-B	732-A
Armstrong Numbers.....	979-A	980-A										
Williams Numbers.....	979-A	980-A										
Billings & Spencer Numbers.....	733-A	733-B										

SINGLE HEAD OFFSET PATTERN HEXAGON

Armstrong Numbers.....	861-A	862-A	863-A	863-D	864-A	865-D	865-A	866-D	867-A	867-D	868-A	
Williams Old Numbers.....	961-A	962-D	963-A	963-D	964-A	965-D	965-A	966-D	967-A	967-D	968-A	
Williams New Numbers.....	261-A	262-D	263-A	263-D	264-A	265-D	265-A	266-D	267-A	267-D	268-A	
Billings & Spencer Numbers.....	821-A	822-A	822-B	822-C	823-A	824-A	824-B	825-A	825-B	825-C	826-A	
Armstrong Numbers.....	868-D	869-A	870-A	870-D	871-A	872-D	873-A	874-D	875-A	875-D	876-A	
Williams Old Numbers.....	968-D	969-A	970-A	970-D	971-A	971-D	973-A	974-D	975-A	975-D	976-A	
Williams New Numbers.....	268-D	269-A	270-A	270-D	271-A	271-D	273-A	274-D	275-A	275-D	276-A	
Billings & Spencer Numbers.....	826-B	826-C	827-A	827-B	828-A	828-B	829-A	830-A	830-B	830-C	831-A	

WILLIAMS DROP-FORGED SINGLE HEAD SOCKET WRENCHES

WITH OR WITHOUT PIN-HANDLE FOR HEXAGON NUTS AND CAP SCREWS

UNLESS OTHERWISE SPEC FIED, WRENCHES WITH PIN-HANDLES WILL BE SENT

For illustrations of these wrenches, see page 127.

For S. A. E. Standard Sizes, see page 129.

Offset No.	Straight No.	HEXAGON OPENINGS			Diam. of Head	Extreme Length		PRICE					
		For U. S. Stand'd Nut; Size Bolt	For Cap Screw; Diam. Screw	Broach-ed Opening Across Flats				Unfinished		Semi-finished		Finished	
						(1) Either Offset or Straight, No Pin-Handle	With Pin-Handle and Hole	(2) Either Offset or Straight, No Pin-Handle	With Pin-Handle and Hole	(3) Either Offset or Straight, No Pin-Handle	With Pin-Handle and Hole		
261A	961A	1/8	...	2 1/4	1 1/2	4	....	\$0.20	\$0.30	\$0.30	\$0.40	\$0.40	\$0.50
262D	962D	...	1/8	2 1/4	5/8	4 1/2	3 7/8	.22	.33	.33	.44	.44	.55
263A	963A	1/8	...	2 1/4	1 1/4	4 7/8	4 1/8	.24	.37	.36	.49	.48	.61
263D	963D	...	1/4	2 1/4	1 1/4	4 7/8	4 1/8	.24	.37	.36	.49	.48	.61
264A	964A	1/4	...	2 1/4	3/4	5 1/4	5 1/8	.26	.39	.39	.52	.52	.65
265D	965D	...	3/8	2 1/4	7/8	5 3/4	5 1/8	.29	.43	.44	.58	.58	.72
265A	965A	1/8	...	2 1/4	7/8	5 3/4	5 1/8	.29	.43	.44	.58	.58	.72
266D	966D	...	1/8	2 1/4	1	6 1/8	6 1/4	.32	.47	.48	.63	.64	.79
267A	967A	3/8	...	2 1/4	1 1/8	6 1/2	6 3/4	.36	.53	.54	.71	.72	.89
267D	967D	...	1/2	2 1/4	1 1/8	6 1/2	6 3/4	.36	.53	.54	.71	.72	.89
268A	968A	1/8	...	2 1/4	1 1/4	7	7 1/2	.40	.57	.60	.77	.80	.97
268D	968D	...	5/8	2 1/4	1 1/4	7	7 1/2	.40	.57	.60	.77	.80	.97
269A	969A	1/2	...	2 1/4	1 3/8	7 3/8	8 3/8	.46	.64	.69	.87	.92	1.10
270A	970A	1/8	...	2 1/4	1 1/2	7 7/8	9 1/8	.52	.72	.78	.98	1.04	1.24
270D	970D	...	3/4	1 1/4	1 1/2	7 7/8	9 1/8	.52	.72	.78	.98	1.04	1.24
271A	971A	5/8	...	1 1/4	1 5/8	8 1/4	10	.60	.80	.90	1.10	1.20	1.40
271D	971D	...	7/8	1 1/4	1 5/8	8 1/4	10	.60	.80	.90	1.10	1.20	1.40
273A	973A	3/4	1	1 1/4	1 7/8	9 1/8	11 5/8	.80	1.10	1.20	1.50	1.60	1.90
274D	974D	...	1 1/8	1 1/4	2	9 1/2	12 3/8	.90	1.25	1.35	1.70	1.80	2.15
275A	975A	7/8	...	1 1/4	2 1/8	10	13 1/4	1.00	1.35	1.50	1.85	2.00	2.35
275D	975D	...	1 1/4	1 1/4	2 1/8	10	13 1/4	1.00	1.35	1.50	1.85	2.00	2.35
276A	976A	1	...	1 1/4	2 1/4	10 3/8	14 1/8	1.15	1.55	1.72	2.12	2.30	2.70
277A	977A	1 1/8	...	1 1/4	2 1/2	10 7/8	16 1/2	1.30	1.75	1.95	2.40	2.60	3.05
278A	978A	1 1/4	...	2 3/8	2 3/4	11 3/8	18 1/4	1.60	2.05	2.40	2.85	3.20	3.65
279A	979A	1 3/8	...	2 3/8	3	11 7/8	20	2.10	2.60	3.15	3.65	4.20	4.70
280A	980A	1 1/2	...	2 3/8	3 1/8	12 1/2	21 3/4	2.80	3.45	4.20	4.85	5.60	6.25

WILLIAMS AUTOMOTIVE SINGLE HEAD SOCKET WRENCHES

FOR S. A. E. AND U. S. STD. HEX NUTS AND CAP SCREWS

For illustrations of these wrenches, see page 127.

Offset No.	Straight No.	HEXAGON OPENINGS					Diam. Head	Extreme Length Offset	PRICE					
		Broached Opening Across Flats	For S.A.E. Std. Nut and Cap Screw; Size Bolt	For U. S. Std. Nut; Size Bolt	For Cap Screw; Diam. Screw	Unfinished			Semi-finished		Finished			
						(1) Either Offset or Straight, no Pin-Handle			With Pin-Handle and Handle Hole	(2) Either Offset or Straight, no Pin-Handle	With Pin-Handle and Handle Hole	(3) Either Offset or Straight, no Pin-Handle	With Pin-Handle and Handle Hole	
263D	963D	$\frac{29}{64}$	$\frac{1}{4}$	..	$\frac{1}{4}$	$\frac{11}{16}$	$4\frac{5}{8}$	\$0.24	\$0.37	\$0.36	\$0.49	\$0.48	\$0.61
264A	964A	$\frac{31}{64}$	$\frac{5}{16}$	..	$\frac{5}{16}$	$\frac{3}{4}$	$5\frac{1}{8}$	.26	.39	.39	.52	.52	.65
265D	965D	$\frac{33}{64}$	$\frac{3}{8}$	..	$\frac{3}{8}$	$\frac{7}{8}$	$5\frac{7}{8}$	.29	.43	.44	.58	.58	.72
266D	966D	$\frac{35}{64}$	$\frac{7}{16}$	..	$\frac{7}{16}$	1	$6\frac{1}{4}$	.32	.47	.48	.63	.64	.79
267D	967D	$\frac{37}{64}$	$\frac{1}{2}$	..	$\frac{1}{2}$	$1\frac{1}{8}$	$6\frac{3}{4}$	.36	.53	.54	.71	.72	.89
269A	969A	$\frac{39}{64}$	$\frac{5}{8}$	$\frac{1}{2}$	$\frac{5}{8}$	$1\frac{3}{8}$	$8\frac{3}{8}$	.46	.64	.69	.87	.92	1.10
270S	970S	$\frac{41}{64}$	$\frac{3}{4}$	..	..	$1\frac{1}{2}$	$9\frac{1}{8}$	.52	.72	.78	.98	1.04	1.24
270D	970D	$\frac{43}{64}$	$\frac{7}{8}$	..	$\frac{7}{8}$	$1\frac{1}{2}$	$9\frac{1}{8}$	.52	.72	.78	.98	1.04	1.24
271A	971A	$\frac{45}{64}$	$\frac{1}{4}$	$\frac{5}{8}$	$\frac{3}{4}$	$1\frac{5}{8}$	10	.60	.80	.90	1.10	1.20	1.40	
273A	973A	$\frac{47}{64}$	$\frac{3}{8}$	$\frac{3}{4}$	1	$1\frac{7}{8}$	$11\frac{5}{8}$	.80	1.10	1.20	1.50	1.60	1.90
275A	975A	$\frac{49}{64}$	1	$\frac{7}{8}$	..	$2\frac{1}{8}$	$13\frac{1}{4}$	1.00	1.35	1.50	1.85	2.00	2.35

WILLIAMS' "FORD" DOUBLE HEAD OFFSET SOCKET WRENCH

Heads specially shaped for Cylinder Head Cap Screws.

A most desirable and necessary "Ford" Wrench.

Number 992. Openings $\frac{11}{16}$, length $9\frac{1}{8}$. Price, unfinished, \$0.75; semi-finished, \$1.13; finished, \$1.50.

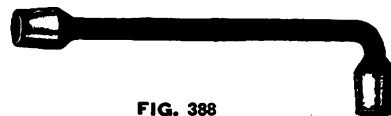


FIG. 388

VLCHEK BENT SOCKET WRENCHES

NO. 920



FIG. 394

Made from best grade seamless steel tubing, ebony finish, tempered.

Size.....	SIZES AND CAPACITY								
	50	51	52	53	54	55	56	57	
For U. S. S. Nut.									
Size of Bolt....	..	$\frac{1}{4}$	..	$\frac{5}{16}$	$\frac{3}{8}$	..	$\frac{7}{8}$	$\frac{1}{2}$	
For Cap. Screw									
Head. Size of Bolt.....	$\frac{1}{4}$	$\frac{5}{16}$	$\frac{3}{8}$	$\frac{7}{8}$	..	$\frac{1}{2}$	$\frac{7}{8}$	$\frac{5}{8}$	
For S. A. E. Nut.									
Size of Bolt....	$\frac{1}{4}$	$\frac{5}{16}$	$\frac{3}{8}$	$\frac{7}{8}$	..	$\frac{1}{2}$	..	$\frac{7}{8}$	
Size of Openings in Both Ends...	$\frac{7}{8}$	$\frac{1}{2}$	$\frac{5}{8}$	$\frac{5}{8}$	$\frac{11}{16}$	$\frac{3}{4}$	$\frac{11}{16}$	$\frac{7}{8}$	
No. 920 List each	.35	.40	.50	.55	.60	.65	.75	.80	

Price includes bar for turning.

VLCHEK BENT SOCKET WRENCH SET

NO. 922

Consisting of one each of the wrenches, size 50, 51, 52, 53, 54, 55, 56, 57.

Contained in heavy canvas case including bars for turning. List..... \$5.00



FIG. 397

THE FAVORITE REVERSIBLE RATCHET WRENCHES

OPEN HEAD TYPE

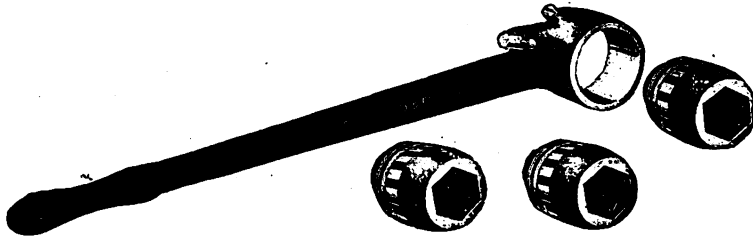


FIG. 412

Wrench heads are interchangeable in each handle as shown. A, B, and C heads fit No. 1 handle, etc. Built strong for rough usage. Opening clear through head.

PRICE LIST OF WRENCHES

Wrench No.	Length of Handle	Take Heads	Head Sent Unless Otherwise Specified	Price Handle and One Head
1	15 ins.	A B C	A	\$4.50
2	28 "	D E F G M	E	5.50
2½	28 "	Z	Z	6.50
3	28 "	H K L	H	7.50

The various wrench heads fit nuts (bolt sizes) as shown in table below.

PRICE LIST OF HEADS

Head	To Fit U. S. Standard Nuts (Bolt Sizes) in inches		Exact Sizes of Openings in Head		Fit Handles	Price
	Sq.	Hex.	Sq.	Hex.		
A	½	½	1½	1½	No. 1	\$2.50
B	5/8	5/8	1½	1½	No. 1	2.50
C	...	5/8x¾	...	1½x1½	No. 1	2.50
D	...	¾x1	...	1½x1½	No. 2	3.00
E	¾	¾	1½	1½	No. 2	3.00
F	7/8	7/8	1½	1½	No. 2	3.00
G	...	1x1	...	1½x1½	No. 2	3.00
M	...	1x1½	...	1½x1½	No. 2	3.00
Z	...	1½x1½	...	1½x2	No. 2½	3.00
H	1	1	1½	1½	No. 3	4.00
K	1½	1½	1½	1½	No. 3	4.00
L	1½	1½	2	2	No. 3	4.00

NO. 0 AND ATTACHMENTS

	Jap- anned	Nickel Plated
One 15-in. Handle and one Head with openings for ¼ in. and ⅜ in. square standard nuts.....	\$4.00	\$6.00
One set of Sockets to fit Head, consisting of one 8-in. Extension Socket, ten sockets to fit standard nuts (1 each) square and hexagon, ⅜, 7/8, 1½, 5/8, ¾-in.....	3.00	4.00
One 15-in. Handle with drill head	7.50	9.50
Length of drill head 7-in. for square shank drills, only.		
Drill Head only.....	6.00	8.00
Complete set, as specified above, on strong, well made Oak Wrench Board, ready to hang in Engine-room.	20.00	25.00

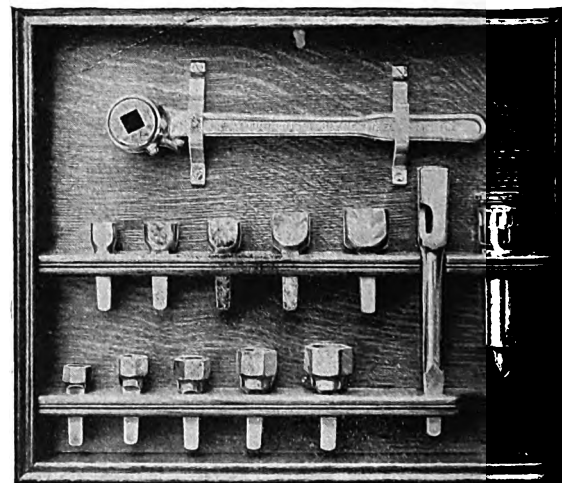


FIG. 413

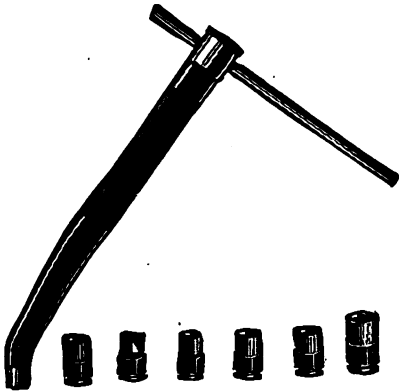
BILLMONT MASTER WRENCH**THE WRENCH THAT SPINS 'EM OFF**

FIG. 3910

A universal socket wrench driving through a stationary member that will reach practically every nut or bolt on body or motor. Adjustable handle allows full turn on nut.

The drive shaft and socket holder rest upon perfectly machined bearings, therefore assuring a smooth running wrench without friction.

The outer tube is coarsely knurled to form a firm hand grip that prevents slipping even with oily hands. The inner driving shaft is propelled by use of a solid round bar handle that slides back and forth so that it may get past obstructions and make a complete turn on nut. This handle is prevented from falling out by a ball and spring in the cap that presses against handle and creates enough friction to make same stay in place until readjusted by operator.

This wrench will take any standard size socket with $\frac{1}{2}$ inch square shank, by using special adapter, and the five nut sockets furnished with wrench are cut from a solid bar, broached and hardened, giving them more than usual strength. A spring steel retainer is used at bottom of socket so they snap into wrench and remain firm and yet be removed with ease.

Every part of this wrench is made from finest steel, heat-treated and ground.

Includes 1 wrench, 5 hexagon sockets, $\frac{1}{16}$, $\frac{1}{8}$, $\frac{1}{4}$, $\frac{3}{8}$, $\frac{1}{2}$ and 1 adapter.

List Price (in wooden box).....\$10.00

BILLMONT COMBINATION SOCKET WRENCH SETS

All sockets finely machined, broached and hardened.

SET NO. 300 WITHOUT WRENCH

Contains 24 sockets (without wrench) in Hardwood Case.

Price per set.....\$11.80

SET NO. 100 WITH WRENCH

Contains 24 sockets and Master Wrench, Fig. 3910; in Hardwood Case.

Price per set.....\$19.50

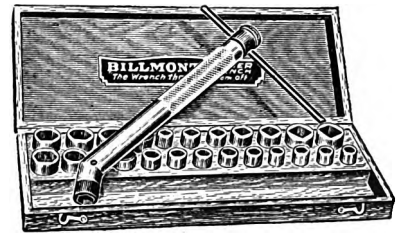


FIG. 3910 1/2

BILLMONT SOCKETS**HEXAGON SOCKETS**

No.	Socket Size	U.S.S. Nuts Size Bolt	Hex. Head Cap Screws U.S. Std.	S.A.E. Std. Nuts and Cap Screw	A. L. A. M.	Mfgs. Std. Bolt Head
12	$\frac{3}{16}$ "					
13	$\frac{1}{4}$ "					
14	$\frac{1}{2}$ "					
15	$\frac{3}{4}$ "					
16	$\frac{1}{2}$ "	$\frac{1}{4}$ "	$\frac{5}{16}$ "	$\frac{5}{16}$ "	$\frac{1}{8}$ "	
17	$\frac{3}{4}$ "					
18	$\frac{1}{2}$ "		$\frac{3}{8}$ "	$\frac{3}{8}$ "	$\frac{3}{8}$ "	$\frac{3}{8}$ "
19	$\frac{3}{4}$ "	$\frac{5}{16}$ "				
20	$\frac{1}{2}$ "		$\frac{7}{16}$ "	$\frac{7}{16}$ "		
21	$\frac{3}{4}$ "					
22	$\frac{1}{2}$ "	$\frac{3}{8}$ "			$\frac{7}{16}$ "	
24	$\frac{3}{4}$ "		$\frac{1}{2}$ "	$\frac{1}{2}$ "	$\frac{1}{2}$ "	$\frac{1}{2}$ "
25	$\frac{1}{2}$ "					
26	$\frac{3}{4}$ "		$\frac{9}{16}$ "	$\frac{9}{16}$ "		
28	$\frac{1}{2}$ "		$\frac{5}{8}$ "	$\frac{5}{8}$ "	$\frac{5}{8}$ "	$\frac{5}{8}$ "
30	$\frac{3}{4}$ "					
31	$\frac{1}{2}$ "					

SQUARE SOCKETS

Number	Socket Size	Sq. Head Set Screw	Sq. Head U. S. S. Cap Screws	Sq. Head U. S. S. Nut Bolt Size
014	$\frac{1}{16}$ "	$\frac{1}{16}$ "	$\frac{5}{16}$ "	
016	$\frac{1}{8}$ "	$\frac{1}{8}$ "	$\frac{3}{8}$ "	$\frac{1}{4}$ "
018	$\frac{9}{16}$ "	$\frac{9}{16}$ "	$\frac{1}{8}$ "	
019	$\frac{1}{8}$ "			$\frac{5}{16}$ "
020	$\frac{5}{8}$ "	$\frac{5}{8}$ "	$\frac{1}{2}$ "	
022	$\frac{11}{16}$ "		$\frac{9}{16}$ "	$\frac{3}{8}$ "
024	$\frac{3}{4}$ "	$\frac{3}{4}$ "	$\frac{5}{8}$ "	

Order by number.

Any of the above sockets, either Hexagon or Square:

Price, each.....\$0.40

HEXALL SOCKET WRENCHES

COMBINATION SQUARE AND HEXAGON RATCHET SET

NO. 1—16 PIECES

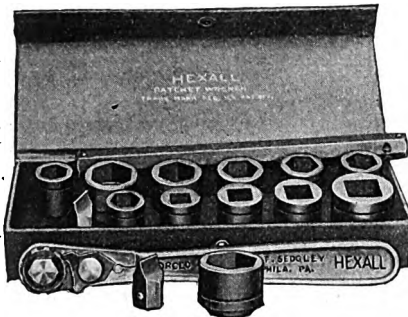


FIG. 3911

Contains 7" Steel Forged, Ratchet Handle, 2 Forged Steel Screw Driver Bits, 7" Extension Bar, 8 Hexagon Sockets, 4 Square Sockets. For the following:

Sockets	1	2	3	4	5	6	7
U. S. Standard Bolt.....	$\frac{1}{4}$ in.	BASTARD BOLTS	$\frac{5}{16}$ in.	BASTARD BOLTS	$\frac{3}{8}$ in.	$\frac{7}{16}$ in.	$\frac{1}{2}$ in.
Cap Screw.....	$\frac{5}{16}$ in.		$\frac{1}{2}$ in.		$\frac{7}{16}$ in.	$\frac{1}{2}$ in.	$\frac{5}{8}$ in.
U. S. Standard Castellated....	$\frac{1}{4}$ in.		$\frac{3}{8}$ in.		$\frac{3}{8}$ in.	$\frac{1}{2}$ in.	$\frac{1}{2}$ in.
A. L. A. M. Castellated.....	$\frac{5}{16}$ in.		$\frac{3}{8}$ in.		$\frac{7}{16}$ in.	$\frac{1}{2}$ in.	$\frac{1}{2}$ in.
A. L. A. M. Plain.....	$\frac{5}{16}$ in.	BASTARD BOLTS	$\frac{3}{8}$ in.	BASTARD BOLTS	$\frac{7}{16}$ in.		$\frac{5}{8}$ in.
Standard Square Bolt.....	$\frac{1}{4}$ in.		$\frac{3}{8}$ in.		$\frac{7}{16}$ in.		$\frac{1}{2}$ in.
Standard Square Nut.....	$\frac{1}{4}$ in.		$\frac{3}{8}$ in.		$\frac{7}{16}$ in.		$\frac{5}{8}$ in.
Square Head Cap Screw.....	$\frac{1}{4}$ in.						

Packed in neat strong cloth case, weight 35 ounces. List Price.....\$4.25

HEXAGON RATCHET SET

NO. 2—11 PIECES

Contains 7" Steel Forged, Ratchet Handle, 2 Screw Driver Bits, 7" Extension Bar, 7 Hexagon Sockets.



FIG. 395

HEXAGON SOCKET SET

NO. 5—8 PIECES

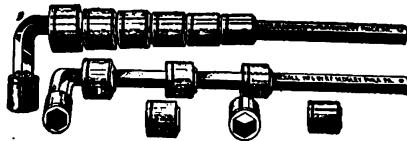


FIG. 398

10" Handle made from $\frac{1}{2}$ inch Hexagon Steel. 7 Hexagon Sockets, with same range as No. 2 set.

Sockets pack neatly on handle when not in use. Friction Ball prevents them from falling off. Can be used as an extension with wrench on short end.

PRICE LIST HEXALL NOS. 2 AND 5

Sockets	1	2	3	4	5	6	7	Weight	Price
U. S. Standard Bolt	$\frac{1}{4}$ in.	Bastard Bolts	$\frac{5}{16}$ in.	Bastard Bolts	$\frac{3}{8}$ in.	$\frac{7}{16}$ in.	$\frac{1}{2}$ in.	No. 2 27 oz.	No. 2 in Cloth Case \$2.75
Cap Screw	$\frac{5}{16}$ in.		$\frac{1}{2}$ in.		$\frac{1}{2}$ in.	$\frac{7}{16}$ in.	$\frac{5}{8}$ in.		
U. S. Standard Castellated	$\frac{1}{4}$ in.		$\frac{3}{8}$ in.		$\frac{3}{8}$ in.	$\frac{7}{16}$ in.	$\frac{1}{2}$ in.	No. 5 21 oz.	No. 5 \$1.75
A. L. A. M. Castellated	$\frac{5}{16}$ in.		$\frac{3}{8}$ in.		$\frac{7}{16}$ in.	$\frac{1}{2}$ in.	$\frac{5}{8}$ in.		
A. L. A. M. Plain	$\frac{5}{16}$ in.		$\frac{3}{8}$ in.		$\frac{7}{16}$ in.				

BLACKHAWK COMBINATION WRENCH SETS

FOR AUTOMOBILISTS, MACHINISTS, ENGINEERS, TRACTORS, AEROPLANES, GARAGE AND SERVICE STATION USE

Made of the very best material throughout. The sockets are machine turned from the solid steel bar and properly tempered. The openings of all sockets are accurately broached 1-64 inch oversize, which insures perfect fit and unlimited service.

All these tools are finished with the Parker rust proof process which insures against rust, making them very popular for motor boat, automobile, motor cycle, aeroplane, garage and service station use.



FIG. 3912

SET NO. 6

This set contains 15 Hexagon Machined steel sockets, sizes $\frac{1}{8}$ to $1\frac{1}{4}$ inches inclusive; one each 9 inch ratchet wrench, universal joint, 8 inch extension bar, combination tee and offset handle.

Packed in wooden box. List Price.....\$ 8.00

SET NO. 10

This set is very complete and will enable the user to reach places difficult of access or in cramped quarters, where the ordinary type of wrench is out of the question. To meet all conditions this set includes ratchet wrenches, brace wrench, extension bars, universal joint, etc.

Contains 9" ratchet wrench, 2 extension bars, pipe wrench, brace wrench, universal joint, 2 spark plug sockets, 5 open end thin wrenches, pliers, combination tee and offset handle, double end screw driver, valve grinding attachment, cotter pin puller, 16 hexagon sockets, sizes, $\frac{1}{8}$, $\frac{1}{4}$, $\frac{3}{8}$, $\frac{1}{2}$, $\frac{5}{8}$, $\frac{3}{4}$, $\frac{7}{8}$, 1 , $1\frac{1}{8}$, $1\frac{1}{4}$, $1\frac{1}{2}$, $1\frac{3}{4}$, and 11 square machined steel sockets, sizes, $\frac{1}{8}$, $\frac{1}{4}$, $\frac{3}{8}$, $\frac{1}{2}$, $\frac{5}{8}$, $\frac{3}{4}$, $\frac{7}{8}$, 1 , $1\frac{1}{8}$, $1\frac{1}{4}$, $1\frac{1}{2}$, $1\frac{3}{4}$, 2 . The case is a heavy wooden box, with hinged cover and in mahogany finish. List Price.....\$18.00

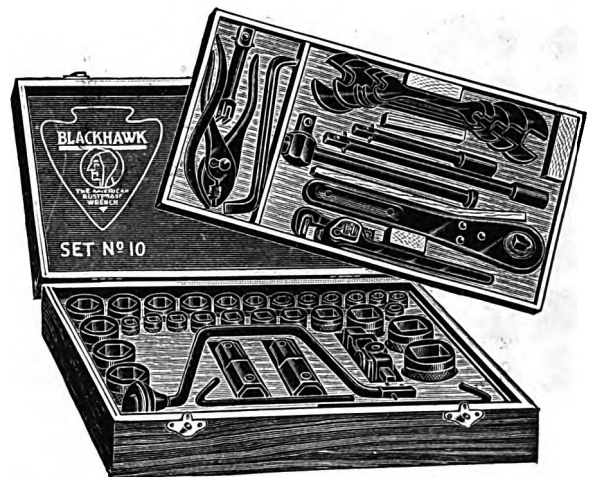


FIG. 3913

BLACKHAWK STEEL SOCKETS HEXAGON AND SQUARE



FIG. 3914

Machined from the solid bar steel. Accurately broached $\frac{1}{64}$ inch oversize, insuring perfect fit. Heat treated and Parker rust proof finish. Order by stock numbers. Each.....\$.25

SIZES BELOW ARE BOLT OR SCREW SIZES TABLE OF SQUARE SOCKETS

No.	Size Opening	Square Head Set Screw	Square Head U. S. S. Cap Screws	Square Head U. S. S. Nut Bolt Size
014	$\frac{1}{32}$	$\frac{1}{16}$	$\frac{5}{16}$	$\frac{1}{4}$
016	$\frac{1}{16}$	$\frac{1}{8}$	$\frac{3}{8}$	$\frac{1}{2}$
018	$\frac{9}{32}$	$\frac{1}{4}$	$\frac{1}{2}$	$\frac{3}{4}$
019	$\frac{11}{32}$	$\frac{5}{16}$	$\frac{3}{4}$	1
020	$\frac{13}{32}$	$\frac{3}{8}$	1	$1\frac{1}{8}$
022	$\frac{15}{32}$	$\frac{7}{16}$	$1\frac{1}{8}$	$1\frac{1}{4}$
024	$\frac{17}{32}$	$\frac{1}{2}$	$1\frac{3}{8}$	$1\frac{1}{2}$
025	$\frac{19}{32}$	$\frac{9}{16}$	$1\frac{5}{8}$	$1\frac{3}{4}$
028	$\frac{21}{32}$	$\frac{5}{8}$	2	$2\frac{1}{8}$
034	$1\frac{1}{8}$	$\frac{3}{4}$	$2\frac{1}{2}$	$2\frac{3}{4}$
041	$1\frac{1}{4}$	1	3	$3\frac{1}{2}$

SIZES BELOW ARE BOLT OR SCREW SIZES

TABLE OF HEXAGON SOCKETS

No.	Socket Sizes	U.S.S. Nuts Size Bolt	Hex. Head Cap. Screws U. S. Std.	S.A.E. Std. Nuts and Cap Screws	M. A. L. A. A.	Mfrs. Std. Bolt Head	Hex. Head Set Screws	Coach Screws
14	$\frac{1}{8}$	...	$\frac{1}{4}$	$\frac{1}{4}$	...	...	$\frac{1}{8}$	...
16	$\frac{1}{4}$	$\frac{1}{4}$	$\frac{5}{16}$	$\frac{5}{16}$	$\frac{1}{8}$	...	$\frac{1}{4}$	...
18	$\frac{3}{8}$	...	$\frac{3}{8}$	$\frac{3}{8}$	$\frac{3}{8}$	$\frac{3}{8}$	$\frac{3}{8}$	$\frac{3}{8}$
19	$\frac{7}{16}$	$\frac{1}{2}$	...	...	...	...	...	...
20	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	...	...	$\frac{1}{2}$	$\frac{1}{2}$
22	$\frac{9}{16}$	$\frac{3}{4}$	...	...	...	...	...	...
24	$\frac{5}{8}$	$\frac{3}{4}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{3}{4}$	$\frac{1}{2}$
25	$\frac{11}{16}$	$\frac{7}{8}$	...	...	...	...	...	...
26	$\frac{3}{4}$	$\frac{3}{4}$	$\frac{3}{4}$	$\frac{3}{4}$	...	...	...	...
28	$\frac{7}{8}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{7}{8}$	$\frac{1}{2}$
30	1$	...	...	\frac{5}{8}$	$\frac{5}{8}$	$\frac{5}{8}$	...	$\frac{5}{8}$
31	$1\frac{1}{8}$	$\frac{3}{4}$	...	...	...	...	...	...
32	$1\frac{1}{4}$	...	$\frac{3}{4}$	$\frac{11}{16}$	$\frac{11}{16}$	...	1	...
34	$1\frac{1}{2}$	$\frac{5}{8}$	...	$\frac{3}{4}$	...	$\frac{3}{4}$	...	...
36	$1\frac{3}{4}$	...	$\frac{7}{8}$	...	$\frac{3}{4}$	...	$1\frac{1}{8}$	$\frac{3}{4}$
40	2	$\frac{3}{4}$	1	$\frac{7}{8}$	$\frac{7}{8}$	...	$1\frac{1}{4}$	...

WALDEN WORCESTER COMBINATION SOCKET WRENCH SETS

Sockets are steel, machine turned from the bar and broached accurately to size. Inside depth of socket one-half inch more than thickness of the nut. Ratchet wrench an improved design, simple, strong and reliable. All parts are machine finished to size and designed to give the user the best that can be produced in combination socket wrench sets.

These sets are each packed in tool boxes. Boxes are hardwood, oil finish, made extra thick and with substantial hinges unlike the usual set box.

SET NO. 16

No. 516—9" Ratchet Wrench.

No. 1139—9" Extension Bar.

No. 1102—Universal Joint.

16 Sockets—Hexagon $\frac{1}{8}$, $\frac{1}{2}$, $\frac{9}{16}$, $\frac{5}{8}$, $\frac{11}{16}$, $\frac{3}{4}$, $\frac{13}{16}$, $\frac{1}{2}$, $\frac{11}{8}$, $\frac{1}{2}$, $1\frac{1}{8}$, $1\frac{1}{4}$.

Assortment covers all the various bolt and nut standards.

Box size, $12 \times 5\frac{1}{4} \times 2\frac{5}{8}$.

Weight, 9.50 lbs.

List Price Complete.....\$12.00

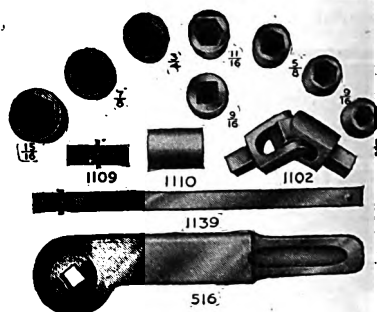


FIG. 3916

SET NO. 27

No. 716—12" Ratchet Wrench.

No. 1139—9" Extension Bar.

No. 1104—Combination T and offset wrench.

No. 1102—Universal Joint.

No. 1178—Brace Socket Wrench.

No. 1109—Plug Connector.

No. 1110—Socket Connector (2).

16 Hex. Sockets— $\frac{1}{8}$, $\frac{1}{2}$, $\frac{9}{16}$, $\frac{5}{8}$, $\frac{11}{16}$, $\frac{3}{4}$, $\frac{13}{16}$, $\frac{1}{2}$, $\frac{11}{8}$, $\frac{1}{2}$, $1\frac{1}{8}$, $1\frac{1}{4}$.

11 Square Sockets— $\frac{3}{8}$, $\frac{1}{2}$, $\frac{9}{16}$, $\frac{5}{8}$, $\frac{11}{16}$, $\frac{3}{4}$, $\frac{7}{8}$, 1 , $1\frac{1}{8}$, $1\frac{1}{4}$.

No. 100 Set—5 open end wrenches.

Box size $16 \times 10 \times 2\frac{1}{2}$. Weight, 22 lbs.

List Price Complete.....\$22.00

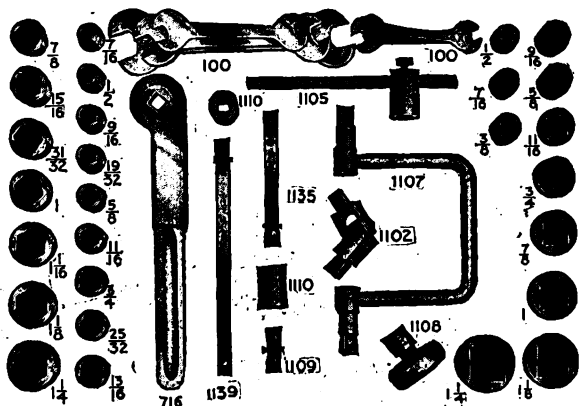


FIG. 3917

WALDEN STEEL SOCKETS

Sockets are steel, machine made from the solid bar. Broaching depth is the thickness of the nut to be fitted, and broached 1-64 inch over the size of the nut. Sockets are counter drilled, making extreme bolt size depth of socket $\frac{1}{2}$ inch more than the thickness of the nut. The outside diameter of the socket size and taper have been designed to insure strength and service conditions. The broached end is countersunk slightly to relieve the square edges and to allow more rapid placing of socket on bolt head.



FIG. 3918

SQUARES			HEXAGON		
No.	Size	List	No.	Size	List
112-118	$\frac{3}{8}$ "	\$0.30	214-222	$\frac{7}{16}$ "	\$0.30
120-122	$\frac{5}{8}$ "	.40	224-230	$\frac{3}{4}$ "	.40
124-140	$\frac{3}{4}$ ", $1\frac{1}{4}$ "	.60	231-240	$\frac{13}{16}$ ", $1\frac{1}{4}$ "	.50

Socket Numbers		Socket Sizes	SIZES, SCREW-BOLT-NUTS				Socket Numbers		Socket Sizes	SIZES, SCREW-BOLT-NUTS			
Square	Hex.		S. A. E. Nuts Cap Screws	U. S. Std. Nuts	U. S. Std. Cap Screws	U.S. Std. Bolt Heads Un-finished	Square	Hex.		S. A. E. Nuts Cap Screws	U. S. Std. Nuts	U. S. Std. Cap Screws	U.S. Std. Bolt Heads Un-finished
112	...	$\frac{3}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	...	226	$\frac{11}{16}$	...	...	$\frac{1}{2}$	...
114	214	$\frac{7}{16}$	$\frac{1}{4}$	...	$\frac{1}{4}$	...	128	228	$\frac{1}{8}$	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{5}{8}$	$\frac{1}{2}$
116	216	$\frac{1}{2}$	$\frac{3}{8}$	$\frac{1}{4}$	$\frac{3}{8}$	$\frac{1}{4}$	...	230	$\frac{11}{16}$	$\frac{3}{8}$	...	...	...
118	218	$\frac{9}{16}$	$\frac{1}{2}$	...	$\frac{1}{2}$	...	...	231	$\frac{11}{16}$	...	$\frac{1}{2}$	...	$\frac{1}{2}$
...	219	$\frac{5}{8}$	...	$\frac{1}{2}$	...	$\frac{1}{2}$	...	232	$1\frac{1}{8}$	$\frac{11}{16}$	...	$\frac{3}{4}$	...
120	220	$\frac{11}{16}$	$\frac{3}{4}$	...	$\frac{3}{4}$	$\frac{3}{8}$	...	234	$1\frac{1}{8}$	$\frac{3}{4}$	$\frac{5}{8}$	...	$\frac{5}{8}$
122	222	$\frac{13}{16}$	$1\frac{1}{8}$	...	$1\frac{1}{8}$	...	...	236	$1\frac{1}{8}$	...	$\frac{1}{2}$	...	$\frac{1}{2}$
124	224	$\frac{3}{4}$	$1\frac{1}{4}$	...	$1\frac{1}{4}$	...	136	240	$1\frac{1}{4}$	$\frac{1}{2}$	$\frac{3}{4}$	1	$\frac{3}{4}$
...	225	$\frac{15}{16}$	...	$\frac{1}{2}$	...	$\frac{1}{2}$	140	...	...	...	...	...	...

MOSSBERG SOCKET WRENCH SETS

SMALL SERIES

SET NO. 14

SQUARE AND HEXAGON SOCKETS

1 Mossberg ratchet wrench No. 350 and extension bar; 1 Mossberg No. 340 take-down handle and extension bar; 1 Mossberg No. 320 offset socket wrench; 1 Sterling No. 100 finest nickeled plier; 1 No. 1 General service double-end wrench set, extra finished ten different openings; 1 Universal joint; 3 special spark plug sockets, sizes $\frac{3}{8}$ inch, $1\frac{1}{2}$ inches and $1\frac{3}{4}$ inches; 1 cotter pin extractor No. 1; 23 sizes, thoroughly hardened and mottled finish Hex. sockets; 11 sizes, thoroughly hardened and rust-proof finish square sockets; 1 double-end offset screw driver. List price, in wooden box..... \$17.00

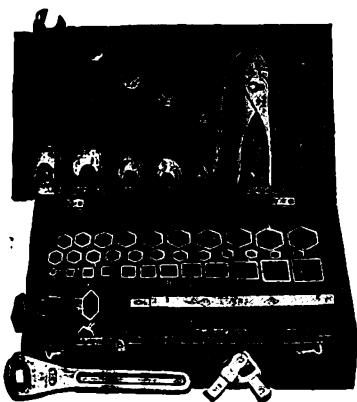


FIG. 400

AUTO CLE (LARGE) SET NO. 1

SQUARE AND HEXAGON SOCKETS

Large Auto Cle set is an arrangement of socket wrenches, covering from $\frac{1}{8}$ inch to $1\frac{1}{2}$ inch hexagon opening, and $\frac{1}{2}$ inch to $\frac{3}{4}$ inch square opening, which are used with the famous Auto Cle ratchet handle.

Auto Cle is marketed in substantial wooden boxes containing the following: One take-down reversible handle, nickel plated; 1 swivel or Universal joint, which permits using the wrench at any angle; 1 $9\frac{1}{2}$ inch extension bar; one $1\frac{1}{4}$ inch extension bar; 1 offset screw driver; 31 sizes of pressed steel sockets, rust-proof finish.

List price, in wooden box..... \$14.00

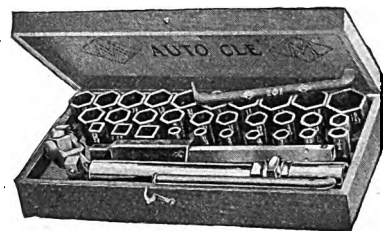


FIG. 399

LARGE SERIES

SET NO. 19

HEXAGON SOCKETS

This set is an assortment of hexagon sockets with various handles, and is splendidly adapted for heavy, large-sized construction work. In wooden case containing: Reversible ratchet handle 18 inches long; offset handle 15 inches long; extension tube 10 inches long; Universal joint; connection bushing (for use with small series sockets), 9 large series, black finish, rust-proof, pressed steel hexagon sockets from $\frac{3}{8}$ to $2\frac{1}{2}$ by $\frac{1}{8}$ inches. List price, in wooden box..... \$20.00

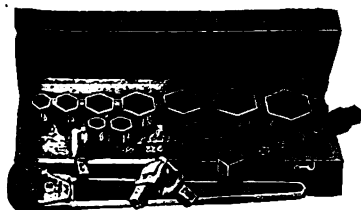


FIG. 3919

SET NO. 20

SQUARE AND HEXAGON SOCKETS

This set includes a connection bushing that fits both the ratchet socket wrench handle and the long extension tube. This reduces the opening in these tools to enable the user to employ the small series sockets (sizes $\frac{1}{8}$ to $1\frac{3}{4}$ inches), but reasonable care must be observed in using the thinner steel sockets, originally planned for smaller leverage, with the powerful 18 inch handle.

In wooden box containing: ratchet socket wrench handle 18 inches long; offset socket wrench handle; 10 inch extension tube; 18 inch extension tube; Universal joint (for indirect adjustment); connection bushing for small series sockets, 9 heavy duty rust-proof, thoroughly hardened hexagon pressed steel sockets from $\frac{3}{8}$ to $2\frac{1}{2}$ by $\frac{1}{8}$ and 6 square from $\frac{3}{8}$ to $1\frac{1}{2}$ by $\frac{1}{8}$ and $2\frac{1}{2}$. List price, in wooden box. . \$25.00

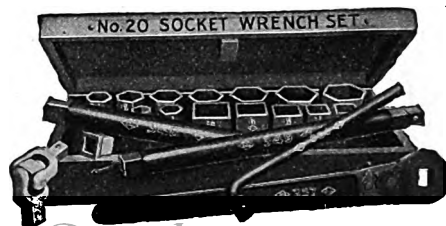


FIG. 3920

MOSSBERG PRESSED STEEL SOCKETS **SMALL SERIES**

Mossberg Pressed Steel Sockets fit hexagon or square nuts, set screws and bolt heads.

- 1.—U. S. S. Bolt & Nut Size
- 2.—Head, inches Mfrs. Std.
- 3.—Nut, inches Mfrs. Std.
- 4.—S. A. E. Standard Screw Size
- 5.—Whitworth Standard Bolt Size
- 6.—Hexagon Cap Screw Size
- 7.—Square Head Set Screws
- 8.—Square Head Coach Screws
- 9.—Square Head Cap Screws



FIG. 401

In specifying, dimensions of nuts should be given measured "across the flats," or, in other words, the smallest diameter of nut or bolt head, and unless actual size of socket is ordered, we allow $\frac{1}{16}$ inch for clearance.

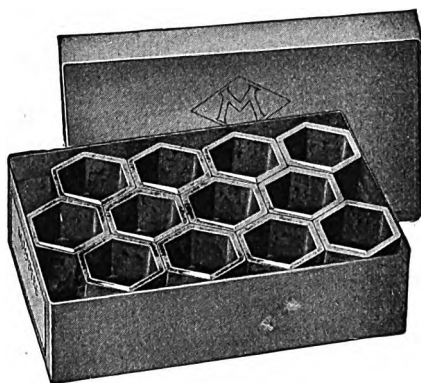


FIG. 402

COMPLETE LIST OF REGULAR SOCKETS

Size Inches	HEXAGON					
	1	2	3	4	5	6
$\frac{3}{16}$	....	....	....	....	....	....
$\frac{1}{8}$	....	....	....	....	....	....
$\frac{1}{4}$	....	....	....	....	....	....
$\frac{3}{8}$	....	$\frac{1}{4}$	....	....	....	....
$\frac{1}{2}$	....	....	$\frac{1}{4}$	$\frac{1}{4}$	....	$\frac{1}{4}$
$\frac{5}{8}$	....	$\frac{5}{16}$	....	....	....	$\frac{1}{8}$
$\frac{3}{4}$	$\frac{1}{4}$	....	....	$\frac{1}{8}$	$\frac{1}{4}$	$\frac{1}{8}$
$\frac{7}{8}$	....	$\frac{3}{8}$	$\frac{1}{8}$	$\frac{3}{8}$	....	$\frac{3}{8}$
1	....	....	$\frac{3}{8}$	$\frac{1}{2}$	....	$\frac{1}{2}$
$1\frac{1}{8}$	....	$\frac{7}{8}$	....	....	....	$\frac{1}{2}$
$1\frac{1}{4}$	$\frac{3}{8}$	....	....	....	$\frac{3}{8}$	....
$1\frac{3}{8}$	....	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	....	$\frac{1}{2}$
$1\frac{1}{2}$	$\frac{1}{2}$	....	....	....	....	$\frac{5}{8}$
$1\frac{3}{4}$	....	$\frac{5}{8}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	....
2	$\frac{1}{2}$	....	$\frac{1}{2}$	$\frac{1}{2}$	....	$\frac{5}{8}$
$2\frac{1}{8}$	....	$\frac{5}{8}$	....	$\frac{5}{8}$	....	....
$2\frac{1}{4}$	....	....	....	....	....	....
$2\frac{3}{4}$	$\frac{3}{4}$	....	....	$\frac{7}{8}$	$\frac{1}{2}$	$\frac{7}{8}$
$3\frac{1}{4}$	....	....	....	....	....	1
Size Inches	SQUARE					
	1	2	3	7	8	9
$\frac{3}{16}$	....	$\frac{1}{4}$	....	$\frac{3}{8}$	$\frac{1}{4}$	$\frac{1}{4}$
$\frac{1}{8}$	....	....	$\frac{1}{4}$	$\frac{1}{2}$	$\frac{1}{8}$	$\frac{1}{8}$
$\frac{1}{4}$	$\frac{1}{4}$	$\frac{5}{8}$	....	$\frac{1}{2}$	$\frac{1}{8}$	$\frac{3}{8}$
$\frac{3}{8}$	....	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{8}$	$\frac{1}{2}$
$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	....	$\frac{3}{4}$	$\frac{1}{2}$	$\frac{1}{2}$
$\frac{5}{8}$	....	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{3}{4}$	$\frac{1}{2}$	$\frac{3}{4}$
$\frac{3}{4}$	$\frac{1}{2}$	$\frac{5}{8}$	$\frac{5}{8}$	1	....	....
$1\frac{1}{8}$	....	$\frac{3}{4}$	....	....	$\frac{3}{4}$	....
$1\frac{1}{4}$	$\frac{3}{4}$	....	....	....	....	1

Prices		Each	Per Dozen
Hexagon, all sizes.....		\$0.35	\$2.40
Square, all sizes.....		.35	2.40

LARGE SERIES

All Mossberg socket handles will not fit both series of sockets, although a bushing can be supplied with the larger handles so that all small series sockets may be used with large type of handles. The smaller handles will not give enough leverage with the larger series of sockets, and, accordingly, these cannot be used conjointly.

Size Inches	Hexagon		Size Inches	Square	
	1	4		1	7
$\frac{3}{16}$	$\frac{1}{2}$	$\frac{3}{4}$	$\frac{3}{16}$	$\frac{1}{2}$	$\frac{7}{8}$
$\frac{1}{8}$	$\frac{5}{8}$	$\frac{1}{2}$	$\frac{1}{8}$	$\frac{5}{8}$	....
$\frac{1}{4}$	$\frac{3}{4}$	$\frac{3}{4}$	$\frac{1}{4}$	$\frac{3}{4}$	$1\frac{1}{4}$
$\frac{3}{8}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{3}{8}$	$\frac{1}{2}$	....
$\frac{1}{2}$	1	1	$\frac{1}{2}$	1	....
$\frac{5}{8}$	$1\frac{1}{8}$	$1\frac{1}{8}$	$\frac{5}{8}$	$1\frac{1}{4}$	....
$\frac{3}{4}$	$1\frac{1}{4}$	$1\frac{1}{4}$	$\frac{3}{4}$	....	....
$1\frac{1}{8}$	$1\frac{1}{2}$	$1\frac{1}{2}$	1	....	....
$1\frac{1}{4}$	$1\frac{3}{4}$	$1\frac{3}{4}$	....	....	....
$1\frac{3}{8}$	$2\frac{1}{8}$	$2\frac{1}{8}$	....	....	....
$1\frac{1}{2}$	$2\frac{1}{4}$	$2\frac{1}{4}$	....	....	....
$1\frac{3}{4}$	$2\frac{3}{4}$	$2\frac{3}{4}$	....	....	....
$2\frac{1}{8}$	$3\frac{1}{8}$	$3\frac{1}{8}$	....	....	....
$2\frac{1}{4}$	$3\frac{1}{4}$	$3\frac{1}{4}$	....	....	....
$2\frac{3}{8}$	$3\frac{3}{8}$	$3\frac{3}{8}$	....	....	....
$2\frac{1}{2}$	$3\frac{1}{2}$	$3\frac{1}{2}$	....	....	....
$2\frac{3}{4}$	$4\frac{1}{4}$	$4\frac{1}{4}$	....	....	....

Prices		Each	Per Dozen
Hexagon, all sizes.....		\$0.70	\$8.00
Square, all sizes.....		.70	6.00

WALDEN WORCESTER GARAGE SERVICE SET

NO. 30

This combination was made to fit all popular makes of cars, to work wherever particular type wrenches are necessary. Every condition that makes for economy and time saving has been anticipated, and utility provided for. With the No. 30 Garage Service Set you will have every wrench you will need. Your equipment will be standardized. The quality of work insured.

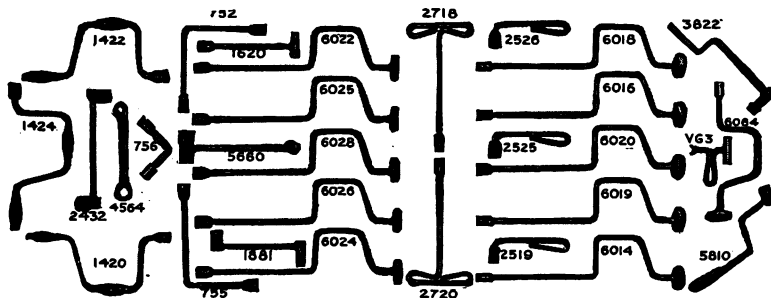


FIG. 3921

A wrench assortment perfectly adapted for work on any motor car, with which time and labor cost to the customer may be economized and the productiveness of the shop and its facilities largely increased. These are special tools, designed after careful study of garage service, each serving a specific purpose and having qualities necessary for thoroughly good work. These thirty wrenches, some with two sockets, are equivalent to thirty-nine different sizes and types as follows: Offset wrenches 13, Speed Wrenches 10, L-Wrenches 6, Special Wrenches 5, Demountable Rim Wrenches 3, Tee-Handle Wrenches 2.

Packed in plain wooden case 20 $\frac{3}{4}$ x7x7; weight, 41 pounds. List Price.....\$22.00

WALDEN WORCESTER FORDSON TRACTOR SET

NO. 85

These wrenches will be found to answer the demands of either farmer or expert repair man in making repairs and adjustments on Fordson Tractors in quickest possible time.

DIRECTORY OF WRENCHES

Clutch housing bolt.....	852	Radiator connection bolt nut.....	856
Clutch lever bracket bolt.....	856	Radiator cover bolt.....	856
Clutch shaft nut.....	851	Radiator cover bolt nut.....	856
Connecting rod cap bolt nut.....	856	Radiator tank bolt.....	852
Crank case bolt.....	856	Radiator tank bolt nut.....	852
Crank case nut.....	856	Radiator top tank cap screw.....	854
Crank shaft bearing cap bolt nut.....	853	Radius rod bolt nut.....	01516
Main bearing nut.....		Rear axle housing cap screw.....	853
Cylinder front cover bolt.....	856	Rear axle split.....	856-855-B
Cylinder front cover cap screw.....	856	Rear wheel hub cap screw.....	855-A-B
Cylinder head cap screw.....	856	Steering arm ball nut.....	01516
Dash cap screw.....	853	Steering arm nut.....	855-A
Differential housing bolt.....	856	Steering shaft nut.....	01516
Differential housing.....	855-B	Steering wheel nut.....	850-01516
Exhaust tube bracket bolt.....	852	Transmission housing bolt.....	856
Fan adjusting nut and screw.....	850	Transmission housing bolt nut.....	856
Foot bracket cap screw.....	854	Transmission housing cap screw.....	856
Front wheel spindle nut.....	855-A	Transmission draw bar cap screw.....	853
Fuel tank strap nut.....	856	Transmission housing plate cap screw.....	856
Gear shifter plate cap screw.....	854	Transmission oil plug.....	855-A
Radiator connection bolt.....	856		

Weight, 13 $\frac{1}{2}$ pounds. List price.....\$8.00

WALDEN WORCESTER UNIVERSAL JOINT TEE HANDLE WRENCH

Tee Flex Universal joints and sockets have been used in combination with wrenches and are now complete in one solid tool. Will reach nuts otherwise inaccessible.

Stock No.	Size Inch	Stock No.	Size Inch
1016	$\frac{1}{2}$	1022	$\frac{1}{4}$
1018	$\frac{3}{8}$	1024	$\frac{1}{4}$
1020	$\frac{1}{2}$	....	....

List Price Each.....\$2.00



FIG. 3923

TEE AND OFFSET HANDLE SOCKET WRENCHES

Wire handle construction and machine turned sockets makes it possible to produce an equally well made and serviceable tool at much less cost than usual drop forged wrenches. Sockets are steel, machine turned from solid bar and broached accurately to size. Wire handles are proper size and class of material to guarantee service. Sockets are so fastened to the wire they will not turn or loosen.

All listed sizes on wire handle socket wrenches are the short diameter of nut or bolt head to be fitted.

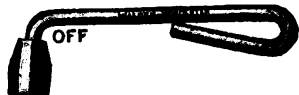


FIG. 410

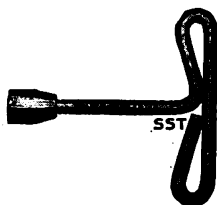


FIG. 409

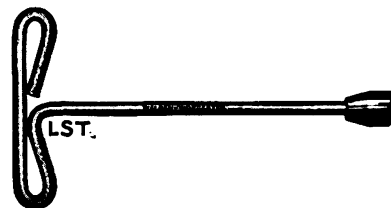


FIG. 411

BLACKHAWK

Fit Hexagon Head Size.....	$\frac{7}{16}$	$\frac{1}{2}$	$\frac{9}{16}$	$\frac{5}{8}$	$\frac{11}{16}$	$\frac{3}{4}$	$\frac{7}{8}$	$\frac{13}{16}$	$\frac{1}{2}$
Fit Cap Screw Size.....	$\frac{1}{4}$	$\frac{5}{16}$	$\frac{3}{8}$	$\frac{7}{16}$	$\frac{1}{2}$	$\frac{5}{8}$	$\frac{3}{4}$	$\frac{7}{8}$	$\frac{15}{16}$
Fit A. L. A. M. Size.....	.....	$\frac{1}{4}$	$\frac{3}{8}$	.....	$\frac{1}{2}$	$\frac{5}{8}$	$\frac{3}{4}$	.....	$\frac{7}{8}$
Fit U. S. S. Nut Size.....	.....	$\frac{1}{4}$	.....	$\frac{5}{16}$	.....	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{5}{8}$	$\frac{3}{4}$

Offset Handle				Tee Handle Short Shank				Tee Handle Long Shank			
Stock No.	Size Inch	Stock No.	Size Inch	Stock No.	Size Inch	Stock No.	Size Inch	Stock No.	Size Inch	Stock No.	Size Inch
1114	$\frac{7}{16}$	1122	$\frac{11}{16}$	2114	$\frac{7}{16}$	2122	$\frac{11}{16}$	3114	$\frac{7}{16}$	3122	$\frac{11}{16}$
1116	$\frac{1}{2}$	1124	$\frac{3}{4}$	2116	$\frac{1}{2}$	2124	$\frac{3}{4}$	3116	$\frac{1}{2}$	3124	$\frac{3}{4}$
1118	$\frac{9}{16}$	1125	$\frac{5}{8}$	2118	$\frac{9}{16}$	2125	$\frac{5}{8}$	3118	$\frac{9}{16}$	3125	$\frac{5}{8}$
1119	$\frac{5}{8}$	1126	$\frac{3}{4}$	2119	$\frac{5}{8}$	2126	$\frac{3}{4}$	3119	$\frac{5}{8}$	3126	$\frac{3}{4}$
1120	$\frac{3}{4}$	1128	$\frac{7}{8}$	2120	$\frac{3}{4}$	2128	$\frac{7}{8}$	3120	$\frac{3}{4}$	3128	$\frac{7}{8}$

Offset Handle, List Price Each, 7 Inch Handle.....\$0.45

Tee Handle, Short Shank, List Price Each, 6 Inch Shank......50

Tee Handle Long Shank, List Price Each, 12 Inch Shank......55

WALDEN WORCESTER

Offset Handle				Tee Handle Short Shank				Tee Handle Long Shank			
Stock No.	Size Inch	Stock No.	Size Inch	Stock No.	Size Inch	Stock No.	Size Inch	Stock No.	Size Inch	Stock No.	Size Inch
2514	$\frac{7}{16}$	2522	$\frac{11}{16}$	2614	$\frac{7}{16}$	2622	$\frac{11}{16}$	2714	$\frac{7}{16}$	2722	$\frac{11}{16}$
2516	$\frac{1}{2}$	2524	$\frac{3}{4}$	2616	$\frac{1}{2}$	2624	$\frac{3}{4}$	2716	$\frac{1}{2}$	2724	$\frac{3}{4}$
2518	$\frac{9}{16}$	2525	$\frac{5}{8}$	2618	$\frac{9}{16}$	2625	$\frac{5}{8}$	2718	$\frac{9}{16}$	2725	$\frac{5}{8}$
2519	$\frac{5}{8}$	2526	$\frac{3}{4}$	2619	$\frac{5}{8}$	2626	$\frac{3}{4}$	2719	$\frac{5}{8}$	2726	$\frac{3}{4}$
2520	$\frac{3}{4}$	2528	$\frac{7}{8}$	2620	$\frac{3}{4}$	2628	$\frac{7}{8}$	2720	$\frac{3}{4}$	2728	$\frac{7}{8}$

Offset Handle, List Price Each, 7 Inch Handle.....\$0.45

Tee Handle Short Shank, List Price Each, 6 Inch Handle, 6 Inch Shank......50

Tee Handle Long Shank, List Price Each, 6 Inch Handle, 12 Inch Shank......55

OFFSET WRENCH FOR DODGE CARS

NO. 1116



FIG. 3924

Offset $\frac{1}{2}$ Inch Socket Clutch housing cover, clutch pedal clamp, breather bolts, counter shaft, oil pan strainer and pipe connections, reverse gear bracket idler, steering gear, transmission case cover and plate, timer gear cover.

List Price Each.....\$0.45

DEMOUNTABLE RIM BRACE SOCKET WRENCHES

For use on demountable rims for car owner, or for use in garage or service station.

BLACKHAWK

Have solid steel knurled swivel handles, which are far more serviceable than wooden handles. Sockets are the best. Parker rust-proof finish.

No.....	5120	5122	5124	5126	5128
Size.....	$\frac{5}{8}$	$\frac{11}{16}$	$\frac{3}{4}$	$\frac{13}{16}$	$\frac{7}{8}$
List Price Each	\$1.00				

SIZES FOR DIFFERENT MAKE RIMS

- 5120—Size $\frac{5}{8}$ " fits Kelsey Jaxon rims.
 5122—Size $\frac{11}{16}$ " fits Fisk Dem., Goodrich, Firestone.
 5124—Size $\frac{3}{4}$ " fits Baker, Continental, Detroit, Fisk, Stan-Weld, Goodyear.
 5126—Size $\frac{13}{16}$ " fits Stan-Weld No. 2, Universal.
 5128—Size $\frac{7}{8}$ " fits Fisk tires.

WALDEN WORCESTER

The steel sockets are machine turned and broached accurately to size and so fastened to the wire that they cannot turn (no pins to shear off). The swivel handles are pressed steel. There is only one size nut on any rim so that this solid handle tool fills all requirements. No loose socket to be misplaced. Length over all, 13½ inches. Sweep 10 inches, swivel handles pressed steel. All listed sizes in wire handle sockets are the short diameter of nut or bolt head to be fitted.

No.....	1420	1422	1424	1426	1428
Size.....	$\frac{5}{8}$	$\frac{11}{16}$	$\frac{3}{4}$	$\frac{13}{16}$	$\frac{7}{8}$
List Price Each	\$1.00				

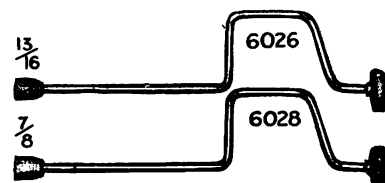
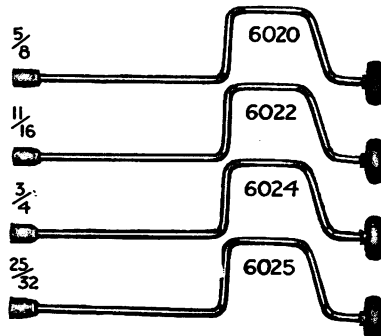
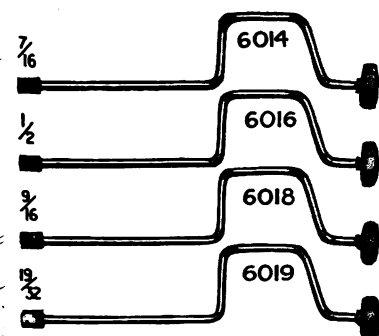
SIZES FOR DIFFERENT MAKE RIMS

- 1420—Size $\frac{5}{8}$ " fits Kelsey, Ford, Jaxon and Simplicity.
 1422—Size $\frac{11}{16}$ " fits Firestone, Goodrich, Fisk-Dem., Gorman.
 1424—Size $\frac{3}{4}$ " fits Stan-Weld, Baker, Buick, Continental, Detroit.
 1426—Size $\frac{13}{16}$ " fits Stan-Weld, No. 2 Universal.
 1428—Size $\frac{7}{8}$ " fits Fisk, Goodyear.

SPEED WRENCHES

Long shank brace socket wrenches are used as speed tools in assembling and dismantling cars. Are most efficient when used on a series of the same sized nuts as on cylinder heads. To gain the most time in removing nuts first release the nut with an offset socket wrench, then spin nut off with brace or speed wrench. These tools are big time savers and considered indispensable in garages where they have been tried.

WALDEN WORCESTER |

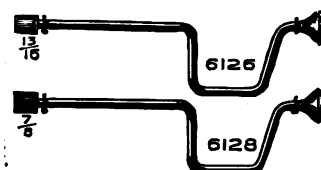
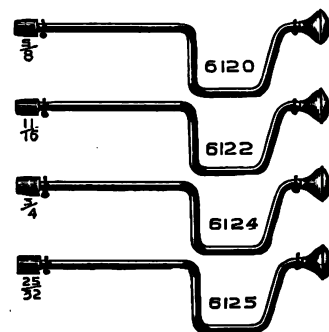
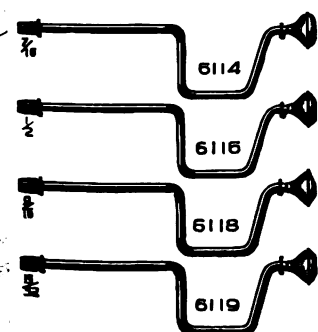


List Price each, all sizes.....\$0.80
 Set No. 600W (10 wrenches)
 List Price.....8.00

FIG. 405

BLACKHAWK

Made heavy, with hardened sockets, steel knobs, handles and Parker rust-proof finish.



List Price each, all sizes.....\$0.80
 Set No. 600B (10 wrenches)
 List Price.....8.00

FIG. 3927

WRENCHES FOR FORD CARS

BLACKHAWK SPEED WRENCHES

NO. 6118

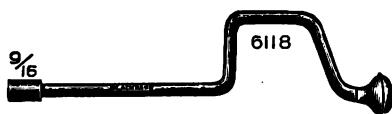


FIG. 3928

Extra heavy $\frac{1}{2}$ inch stock $\frac{1}{8}$ inch socket, especially designed for use on clutch lever and release fork screws and nuts, cylinder cover cap screws, cylinder cover bolt and nut, fan adjusting screw and nut, inlet and exhaust clamp stud and nuts, magnet bolt, muffler bracket bolts and nuts, steering post bracket, transmission band adjusting screw nut, transmission cover bolt and nut. Use this wrench where speed is required.

List Price Each\$0.80

NO. 6120

Extra heavy $\frac{1}{2}$ inch stock, $\frac{5}{8}$ inch socket for use on brake and reverse support nut and bolt, brake shoe support bolt, cylinder head cap screws.

List Price Each.....\$0.80



FIG. 392

WALDEN WORCESTER SPEED WRENCHES

LONG SHANK BRACE NO. 6018



FIG. 3930

Shank 11 inches. Length over all $19\frac{1}{4}$ inches. Socket size $\frac{1}{4}$ inch. Used on commutator case support bolt, crank case and cylinder cover cap screw, fan adjusting screw and nut, magnet bolts, transmission cover bolt and nut.

List Price Each.....\$0.80

LONG SHANK BRACE NO. 6020

Shank 11 inches. Length over all $19\frac{1}{4}$ inches. Socket size $\frac{5}{8}$ inch. Used on commutator case support bolt. (On cars with self-starter.) Cylinder cover cap screw. (On cars with self-starter.) Cylinder head cap screws.

List Price Each.....\$0.80



FIG. 3931

WALDEN WORCESTER RATCHET WRENCH

NO. 4564



FIG. 3932

$\frac{11}{16}$ inch hexagon opening particularly designed for use on the Ford brake and reverse transmission bands. Opposite end $\frac{11}{16}$ inch for use on slow speed connecting lock nut and also Champion X Spark Plugs. One of the most valuable tools to an owner on account of the ease in taking up bands.

List Price Each.....\$1.20

MOSSBERG REVERSE AND BRAKE PEDAL TENSION SPRING

NO. 645

This wrench offers the best possible way to adjust Brake Pedal and Reverse Pedal Tension Springs. It is the cleverest and most efficient tool for the job.

Price Each.....\$0.55



FIG. 3933

WRENCHES FOR FORD CARS

BLACKHAWK HANDY SOCKET WRENCH

NO. 4320

Socket sizes $\frac{5}{8}$ and $\frac{1}{2}$ inch, for use on cylinder head bolts, rear axle housing nuts, drive shaft housing stud nuts, water intake and outlet screws, crank shaft lower cover, controller shaft, bracket nuts and many other places too numerous to mention. The single socket allows one to spin the nut off or on when loose, saving time.

List Price, each.....\$0.65



FIG. 3934

WALDEN WORCESTER DOUBLE SOCKET OFFSET WRENCH

NO. 2418

Length over all 9 inches. Socket sizes $\frac{9}{16}$ and $\frac{3}{4}$ inch. Will fit the following: Brake reverse support bolt and nut, brake shoe support bolt, clutch pedal support bolt and nut, crank case arm bolt and nut (side), crank case arm bolt and nut (top), crankshaft bearing bolt nut, crankshaft rear bearing bolt, dash bracket to dash bolt and nut, differential case stud and nut, fan bracket bolt, front fender iron bolt and nut (bottom), front spring clip nut, inlet and exhaust clamp stud and nut, spindle bolt nut, steering post bracket bolt and nut, steering yoke clamp bolt and nut, universal ball cap, bolt and nut, Universal ball cap screw.

List Price, each.....\$0.75

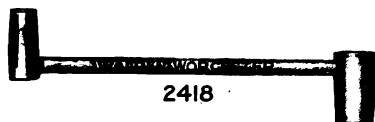


FIG. 3935

WALDEN WORCESTER TRIPLE SOCKET WRENCH

TOMAHAWK NO. 1620

Socket sizes $\frac{5}{8}$ and $\frac{1}{2}$ inch. This is the original Triple Socket Wrench, trademark "TOMAHAWK", having $\frac{1}{2}$ inch rod connecting the two sockets. The sockets are particularly shaped to increase their usefulness. Will fit the following: Axle housing bolt and nut, brake shoe support bolt, cylinder head cap screw, dash bracket to dash bolt and nut, drive shaft roller bearing, stud and nut, water cylinder inlet connection cap screw, water cylinder outlet connection cap screw.

List Price, each.....\$0.65



FIG. 3936

WALDEN WORCESTER TRIPLE SOCKET OFFSET WRENCH

NO. 5660

Socket sizes $\frac{11}{16}$, $\frac{7}{8}$, and $\frac{1}{2}$ inch. Length over all $10\frac{1}{2}$ inches. Handle particularly designed for heavy duty. Will fit the following: Body bracket connecting bolt and nut, front radius rod nut, front spring perch nut, front and rear spring hanger nut, hub bolt and nut, radius rod bolt and nut, rear spring clip nut, spindle bolt with oiler, spindle connecting rod bolt with oiler, spindle connecting rod bolt nut.

List Price, each.....\$1.10



FIG. 3937

WALDEN WORCESTER CONNECTING ROD WRENCH

NO. 5810

Fits all connecting rod cap nuts. Includes the fourth connecting rod. This is an original design, the first wrench made to reach the fourth connection without removing the engine from the car. Be sure you get the wrench with all right angle bends and loop handle.

List Price, each.....\$0.50



FIG. 3938

MOSSBERG RATCHET SOCKET WRENCH HANDLE

NO. 357

For heavy work—steel structural work and difficult assembly of bridges, cranes, and battleships.

Eighteen inches long, it carries tremendous leverage and is primarily adapted for heavy Large Series of Sockets. It can be used, however, with the Small Series of Sockets, by employing a connection bushing although considerable care must be used when employing such power with the smaller sockets. Has no lost motion in its whole circumference, and is ideal for solid heavy duty work.

List Price, each\$6.00

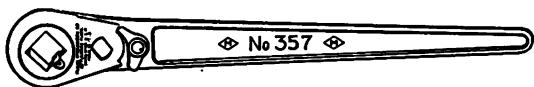


FIG. 3939

ALLIGATOR OR BULLDOG WRENCH

BLACK WITH POLISHED JAWS

Nos.....	2	3	4	5
Holds Pipe, inches.....	$\frac{3}{8}$ to $\frac{3}{4}$	$\frac{1}{2}$ to $1\frac{1}{4}$	$1\frac{1}{4}$ to 2	2 to 3
Length, inches.....	9	15	22	28
Price, each.....	\$1.00	\$2.00	\$3.00	\$4.50

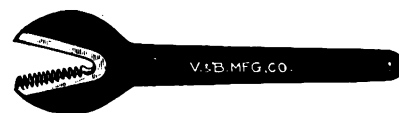


FIG. 414

BILLINGS & SPENCER ADJUSTABLE AUTOMOBILE WRENCHES

MODEL G

Drop-forged from selected Open Hearth steel throughout, and hardened.



FIG. 421

No.	Size Inches	Length Inches	Opens Inches	Thick- ness of Jaw Inches	Depth of Jaw Inches	PRICE EACH		
						Semi- Finished	Full Finished	Nickel Plated
1	6	6 $\frac{1}{2}$	1 $\frac{1}{16}$	$\frac{5}{16}$	1	\$0.60	\$0.70	\$0.85
2	8	8	1 $\frac{7}{16}$	$\frac{3}{8}$	1 $\frac{1}{4}$	.75	.85	1.00
3	10	10 $\frac{3}{4}$	2 $\frac{7}{16}$	$\frac{7}{16}$	1 $\frac{1}{2}$	.85	1.00	1.35
4	12	12 $\frac{1}{4}$	2 $\frac{3}{4}$	$\frac{7}{16}$	1 $\frac{1}{2}$	1.25	1.50	2.00
5	14	14 $\frac{3}{4}$	2 $\frac{13}{16}$	$\frac{9}{16}$	1 $\frac{3}{4}$	1.65	2.00	....
6	18	18 $\frac{1}{4}$	3 $\frac{3}{16}$	$\frac{3}{4}$	2 $\frac{1}{8}$	2.35	2.85	....

EAGLE CLAW WRENCHES



90 DEGREE WRENCH
FIG. 422



45 DEGREE WRENCH
FIG. 425

MADE FROM HIGH GRADE STEEL, DROP-FORGED, BLACK FINISH

The Eagle Claw Wrench will easily hold a round headed bolt by the head to prevent it from turning while unscrewing the nut. Acts as a Plier and does work pliers cannot do, holding round, square, oblong, hexagon and other shaped objects firmly. Can be used as Pipe Wrench. Unexcelled for Automobile Owners, Mechanics, Repair Men, etc.

Numbers	10	20	30	40	50	60
Length, inches.....	7	7	7	10	10	13
Degree.....	90	45	45	90	45	90
Capacity, inches.....	1	1	$\frac{3}{4}$	1 $\frac{1}{4}$	1 $\frac{1}{4}$	1 $\frac{1}{2}$
Weight, each oz.....	9	9	7	20	20	2 lbs.
Price, each.....	\$0.90	\$0.90	\$0.75	\$1.20	\$1.20	\$1.50

GENUINE CRESCENT WRENCHES

Handles drop-forged from the best carbon steel hardened all over. The movable jaw is made from a special alloy steel showing four times the strength of ordinary steel. The entire wrench is carbonized, hardened and oil tempered. Wrenches are polished all over except the web in the handle, which is black oil finished.

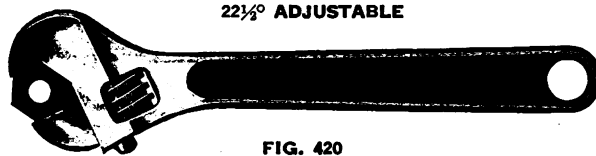


FIG. 420

Length, inches	4	6	8	10	12	15	18
Jaws Open, inches.....	$\frac{1}{2}$	$\frac{3}{4}$	$\frac{15}{8}$	$1\frac{1}{8}$	$1\frac{5}{8}$	$1\frac{11}{8}$	$2\frac{1}{8}$
Ap.Wt. per dozen, lbs.....	$1\frac{1}{2}$	4	8	14	24	52	84
Price, each.....	\$0.65	\$0.65	\$0.80	\$1.00	\$1.50	\$2.25	\$3.25
Price per doz.....	7.80	7.80	9.60	12.00	18.00	27.00	39.00

DOUBLE-END

Size.....	6-8	8-10
Jaws Open, inches.....	$\frac{3}{4}$ - $1\frac{1}{8}$	$1\frac{1}{8}$ - $1\frac{1}{2}$
Weight, per dozen.....	$8\frac{1}{4}$	$14\frac{1}{4}$
Price, each.....	\$1.25	\$1.50
Price, per doz.....	15.00	18.00



FIG. 423

REPAIR PARTS FOR CRESCENT WRENCHES

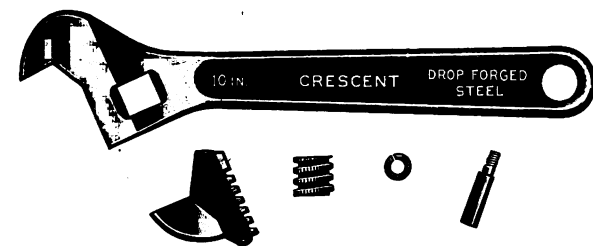


FIG. 424

LIST PRICE

Size	No. 2 Jaw	No. 3 Thumb-screw	No. 4 Pin	No. 5 Spring
4 in.	\$0.50	\$0.20	\$0.10	\$0.10
6 in.	.50	.20	.10	.10
8 in.	.60	.24	.10	.10
10 in.	.80	.30	.10	.10
12 in.	1.20	.50	.20	.10
15 in.	1.70	.70	.20	.10
18 in.	2.30	1.10	.20	.10

BILLINGS & SPENCER HEAVY DUTY ADJUSTABLE "S" WRENCH

MODEL I

A new and improved design, combining strength and utility.
Drop-forged throughout and specially heat-treated.

No.	Size	Capacity	Weight	Price, Each
1	6 in.	$1\frac{1}{8}$ in.	10 oz.	\$0.85
2	8 in.	$1\frac{1}{4}$ in.	1 lb. 3 oz.	1.00
3	10 in.	$1\frac{1}{2}$ in.	2 lb. 2 oz.	1.50



FIG. 419

MAGNETO WRENCH KITS

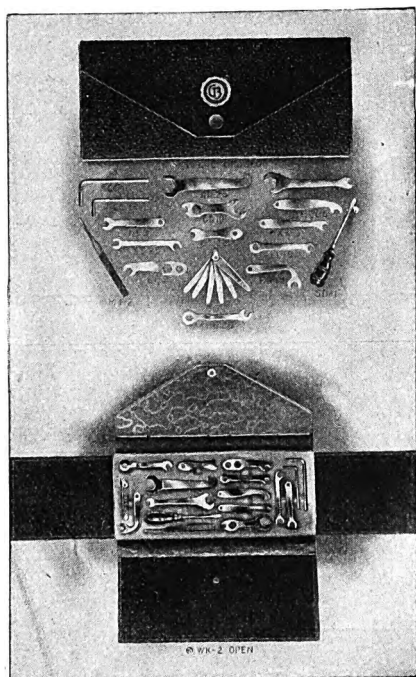


FIG. 3965

IGNITION ADJUSTMENT

WK2

This set is designed to fill any repair or adjustment demand in the way of ignition service. It contains wrenches for making adjustments on every type of Magneto or Distributor System. It also contains magneto point file, screw driver, Remy cam lifter, and thickness spacing gauge complete, with chart for all ignition systems. The case is lined with the best quality of cloth and each article is recessed in place securely. The outer cover of case is of the highest grade of durable Keratol. Net weight, 15 ounces. Dimensions $4\frac{1}{2}'' \times 10\frac{1}{4}'' \times 1''$.

Price per set.....\$3.00

POCKET MAGNETO WK1—LIGHT WEIGHT

This set fulfills the demand for a convenient and compact container for magneto wrenches. No repair man or trouble-shooter can afford to be without one of these sets.

Equipped with a cam lifter and seven wrenches for adjusting the breaker-contact points on Bosch, Connecticut, Delco, Eisemann, Mea, Remy, Splitdorf and Simms Systems. The case is substantial and made of well-finished Keratol; folds to a convenient pocket size.

Price per set.....\$1.00

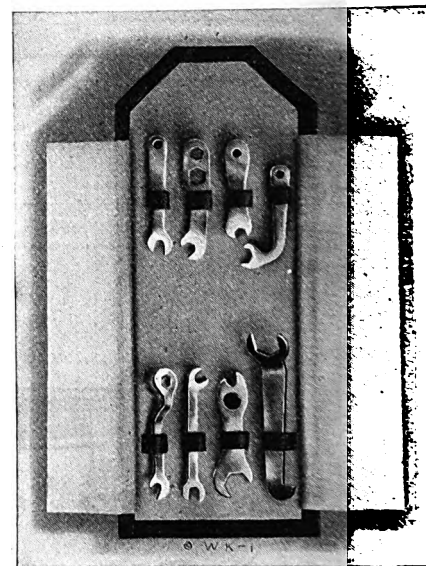


FIG. 3966

POCKET MAGNETO NO. 411—HEAVY WEIGHT

Consists of 7 wrenches and a cam lifter securely arranged in a serviceable leatherette folding pocket case.

A complete set of wrenches for adjusting the breaker contact points on Bosch, Eisemann, Remy, Splitdorf, Mea, and Delco Systems. Also a cam lifter for Remy battery system.

Price per set.....\$2.00

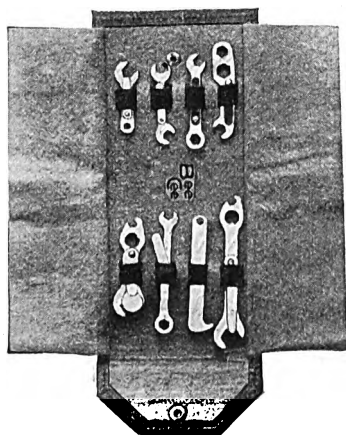


FIG. 3967

GENUINE TRIMO PIPE WRENCHES



STEEL HANDLE—FIG. 426

FIG. 428
MOVABLE JAW

WOOD HANDLE—FIG. 427

FIG. 429
NUT

All Trimo Wrenches are now fitted with nut guards which prevent accidental rotation of nut when once adjusted. The leading sizes are now furnished with steel frames instead of malleable. All Trimo parts are interchangeable. The 6 and 8 inch wrenches are made with and without inserted jaws.

Length, open, inches	6	8	10	14	18	24	36	48
For pipe, inches.....	$\frac{1}{8}$ to $\frac{1}{2}$	$\frac{1}{8}$ to $\frac{3}{4}$	$\frac{1}{8}$ to 1	$\frac{1}{4}$ to $1\frac{1}{2}$	$\frac{1}{4}$ to 2	$\frac{1}{4}$ to $2\frac{1}{2}$	$\frac{1}{2}$ to $3\frac{1}{2}$	1 to 5
Weight doz., lbs.....	6	10	20	39	64	110	219	288
Each.....	\$2.00	\$2.25	\$2.50	\$3.50	\$5.00	\$7.25	\$13.50	\$20.00

Wrenches 6 to 14 inches furnished with either wood or steel handle. Larger sizes, steel handle only.

EXTRA PARTS FOR TRIMO WRENCHES

In ordering parts state size of wrench for which they are required.

For Wrenches Size inches	Movable Jaws		Inserted Jaws		Frame		Nut		Springs	Pins
	Weight Each	Each	Weight Each	Each	Weight Each	Each	Weight Each	Each	Each	Each
6	2 oz.	\$0.75	$\frac{1}{2}$ oz.	\$0.35	$1\frac{1}{4}$ oz.	\$0.38	$\frac{1}{4}$ oz.	\$0.12	\$0.03	\$0.03
8	$3\frac{1}{2}$ "	.80	$\frac{3}{4}$ "	.40	2 "	.42	$\frac{1}{2}$ "	.15	.03	.03
10	7 "	.85	$1\frac{1}{4}$ "	.50	$3\frac{1}{4}$ "	.50	$1\frac{1}{4}$ "	.20	.03	.04
14	$1\frac{1}{4}$ lbs.	1.15	$2\frac{1}{2}$ "	.60	$5\frac{1}{2}$ "	.60	$2\frac{1}{2}$ "	.30	.03	.04
18	$1\frac{1}{4}$ "	1.75	$3\frac{1}{2}$ "	.70	$8\frac{1}{2}$ "	.75	$3\frac{1}{4}$ "	.35	.04	.04
24	2 "	2.25	$5\frac{1}{2}$ "	.80	15 "	.95	$5\frac{1}{4}$ "	.55	.04	.04
36	4 "	4.35	$9\frac{1}{4}$ "	1.10	$1\frac{1}{2}$ lbs.	1.70	12 "	1.10	.04	.05

GENUINE STILLSON PIPE WRENCHES



WOOD HANDLE—FIG. 430



STEEL HANDLE—FIG. 431

DROP-FORGED HIGH GRADE TOOL STEEL, FRAME, SHANK, JAW AND NUT HARDENED AND POLISHED

Length open, inches	6	8	10	14	18	24	36	48
For pipe, inches.....	$\frac{1}{8}$ to $\frac{1}{2}$	$\frac{1}{8}$ to $\frac{3}{4}$	$\frac{1}{8}$ to 1	$\frac{1}{4}$ to $1\frac{1}{2}$	$\frac{1}{4}$ to 2	$\frac{1}{4}$ to $2\frac{1}{2}$	$\frac{1}{2}$ to $3\frac{1}{2}$	1 to 5
Weight doz., lbs.....	$4\frac{1}{4}$	8	20	36	62	108	200	360
Each.....	\$2.00	\$2.25	\$2.50	\$3.50	\$5.00	\$7.25	\$13.50	\$20.00

Wrenches 6 to 14 inches furnished with either wood or steel handle. Larger sizes, steel handle only.

EXTRA PARTS FOR STILLSON WRENCHES

In ordering parts state size of wrench for which they are required.

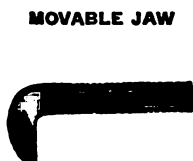


FIG. 432



FIG. 433



FIG. 434

Size, inches	6	8	10	14	18	24	36	48
Bars with springs.....each	\$0.95	1.00	1.10	1.50	2.25	3.50	7.00	10.50
Extra jaws....."	.75	.80	.85	1.15	1.75	2.25	4.35	7.50
Extra frames....."	.38	.42	.50	.60	.75	.95	1.70	2.20
Extra adjusting nuts....."	.12	.15	.20	.30	.35	.55	1.10	1.50
Extra frame pins....."	.03	.03	.04	.04	.04	.04	.05	.05

GENUINE COE'S KEY MODEL WRENCH

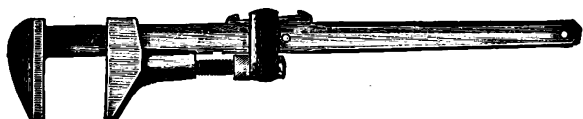


FIG. 435

Designed to fill the gap between the 21-inch and the heavy spanner wrench for large work. It will not batter and jam a large nut as will a chain wrench. Made of heavy steel forgings, fully hardened.

It will not slip or make trouble and will take anything within its capacity, no matter whether square or hexagon. The key cannot come off, and the two positions for jaw straps assure its going into corners without trouble. Warranted free from mechanical defects.

Length, inches.....	28	36	48
Jaws open, inches.....	5½	6¼	9½
Takes hexagon union on pipe, inches.....	4	5	*
Weight, each, lbs.....	19	28	62
Price, black, each.....	\$18.00	\$38.00	\$84.00

*Takes 9 inch hexagon nut.

GENUINE COE'S KNIFE HANDLE WRENCH

Forged high grade steel bar, fully hardened, semi-steel cast jaw, one-piece hardened steel screw, cast semi-steel frame, hardwood handle inserted under metal at both ends and riveted under pressure.

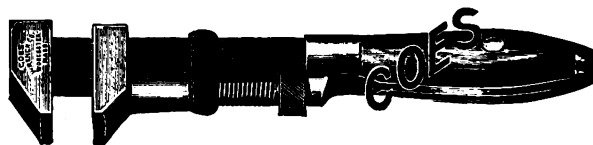


FIG. 436

Length, inches.....	6	8	10	12	15	18	21
Opens, inches.....	1	1¼	1¾	2¼	2¾	3¼	4¼
Weight doz., lbs.....	9	15	25	38	57	78	108
Each.....	\$1.35	\$1.50	\$1.85	\$2.35	\$3.15	\$4.00	\$4.85

GENUINE COE'S STEEL HANDLE WRENCH



FIG. 437

Forged steel bar, hardened and cold swaged, extra heavy hardened semi-steel jaw, one-piece hardened steel screw, cast semi-steel handle riveted through bar. Sizes 6, 8 and 10 inch, with plain bearing screw; 12, 15, 18 and 21 inch with ball-bearing screw.

Length, inches.....	6	8	10	12	15	18	21
Opens, inches.....	1	1¼	1¾	2¼	2¾	3¼	4¼
Weight doz., lbs.....	10	18	28	47	67	97	130
Each.....	\$1.25	\$1.50	\$1.85	\$2.35	\$3.15	\$4.00	\$4.85

WILLIAMS IMPROVED "VULCAN" DROP-FORGED CHAIN PIPE WRENCH

WITH DOUBLE-ENDED REVERSIBLE JAWS FOR TURNING OR HOLDING PIPE, PIPE-FITTINGS, ETC.,
FROM 1-8 TO 18 INCHES DIAMETER

These Wrenches combine the merits of all other chain pipe wrenches as well as special advantages of their own.

Wholly made from drop-forged and otherwise wrought steel, these tools are fully guaranteed and recommended as the most efficient and serviceable chain pipe wrenches made.

The Double-Ended Reversible Jaws, which may be quickly changed end for end as teeth first in use wear, greatly extend the life of the wrench and assure the service of "two tools at the price of one."

The fastening of Jaws to handle with two unusually tough steel studs makes repairs possible in emergencies, insures uninterrupted service of tool and prevents the jaws from spreading. One stud will withstand full working strength of tool, when necessary.

In the "straight-cut" teeth there is thorough distribution of gripping pressure; the tearing of pipe and one-spot wear of teeth will therefore be wholly prevented.

Proof-testing. To insure proper service, each Flat Link Chain is "proof-tested" in a standard tension machine up to two-thirds of its breaking strain listed in table. Each Chain, so tested, is stamped O on the drop-forged swinging link, thus absolutely establishing the safety-factor and reliability of every wrench.

WITH FLAT LINK CHAIN

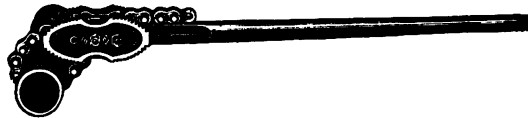


FIG. 438

All parts are interchangeable and replacements are carried in stock. With extra chains, swinging links are furnished and studs and nuts with extra jaws. Cable Chains are supplied only in regular lengths.

Number	30	31	32	33	33½	34	35	*16
*Capacity, size pipe.....	⅜ to ¾	⅜ to 1½	¼ to 2½	¾ to 4	1 to 6	1½ to 8	2 to 12	4 to 18
Extreme Length.....	13¾"	20"	27"	37"	44½"	50½"	64½"	87"
Weight, pounds.....	2½	5¼	10	16	24	31	50	137
Flat Link Chain, Length.....	9½	13½	17½	22½	31	39	54½	74½
Breakage strain, pounds.....	3,600	6,700	9,800	12,500	14,300	15,700	21,600	40,000
Price, Complete Wrench.....	\$2.50	\$3.50	\$5.00	\$7.00	\$9.00	\$11.00	\$18.00	\$40.00
Extra Chain.....	.75	1.00	1.50	2.50	3.50	4.50	7.50	20.00
Extra Jaws, pair.....	1.00	1.75	2.75	4.00	4.75	5.50	7.50	16.00
Extra Nuts and Studs for Jaws per set.....	.20	.25	.35	.45	.55	.70	.90	

*Wrenches for pipe sizes larger than 12 inches are only supplied in the non-reversible jaw form.

WILLIAMS "VULCAN" 1896 PATTERN (OLD STYLE) DROP-FORGED CHAIN PIPE WRENCH

FOR TURNING OR HOLDING PIPE, PIPE-FITTINGS, ETC., FROM 1-8 TO 18 INCHES DIAMETER

To insure proper service, each Flat Link Chain is "proof-tested" in a standard tension machine up to two-thirds of its "breaking strain" as listed in table. Each chain so tested is stamped O on the drop-forged swinging link, thus absolutely establishing the safety factor and reliability of every wrench.

Jaws are not reversible.

WITH FLAT LINK CHAIN



FIG. 440

WITH CABLE CHAIN



FIG. 441

Number	10	11	12	13	13½	14	15	16
Capacity, size pipe.....	⅜ to ¾	⅜ to 1½	¼ to 2½	¾ to 4	1 to 6	1½ to 8	2 to 12	4 to 18
Extreme Length.....	13¾"	20"	27"	37"	44½"	50½"	64½"	87"
Weight.....	1¾	5¼	10	16	24	31	50	137
Flat Link Chain, Length.....	9½	13½	17½	22½	31	39	54½	74½
Breaking Strain, pounds.....	3,600	6,700	9,800	12,500	14,300	15,700	21,800	40,000
Cable Chain, Length.....	9¾	14½	18	27	33½	42	57	76
Size Iron.....	1½	2	2½	3	3½	4	5	6
Breaking Strain, pounds.....	1,200	4,000	6,000	10,500	12,500	15,000	19,000	40,000
Price, Complete Wrench.....	\$2.50	\$3.50	\$5.00	\$7.00	\$9.00	\$11.00	\$18.00	\$40.00
Extra Chain.....	.75	1.00	1.50	2.50	3.50	4.50	7.50	20.00
Extra Jaws, pair.....	1.00	1.75	2.75	4.00	4.75	5.50	7.50	16.00
Extra Screws and Pins, per set....	.20	.22	.25	.30	.35	.40	.50	1.30

ADJUSTABLE HACK SAW FRAMES



FIG. 442

MILLERS FALLS

NO. 6.

Adjustable from 6 to 12 inches.

Rare tropical wood handle; polished and nicked steel stock, $\frac{1}{8}$ x $\frac{1}{4}$ inch. Stiff, strong back. Blades strained by turning of the handle; may be faced in four directions. Knurled check nut screwing down to overlap the end of the blade and hold it in place while being adjusted in the frame. Weight per dozen (with pasteboard boxes) 18 lbs. Depth under back, $2\frac{3}{4}$ inches.

Price, each, with one 12-inch blade..... \$2.55



FIG. 443

MILLERS FALLS

NO. 27

Adjustable from 8 to 12 inches.

Frame of $\frac{1}{8}$ x $\frac{1}{4}$ steel stock; polished and nicked; stained hardwood handle. Blades strained by thumb nut and screw stud; may be faced in four directions. Weight per dozen (with pasteboard boxes) $12\frac{1}{2}$ lbs. Depth under back, $3\frac{1}{4}$ inches.

Price, each, with one 10-inch blade..... \$1.90

"PISTOL GRIP" MILLERS FALLS

NO. 1011

Adjustable from 8 to 12 inches, with scale for different lengths on the back of the frame.

Black composition handle; polished and nicked steel stock, $\frac{1}{8}$ x $\frac{1}{4}$ inch. Compact, stiff frame, with extra strength in the middle of the back where there is the greatest strain. Handle a perfect fit for any size of hand, secured to the frame by a steel rib extending nearly the full length of the handle and shaped so as to make the tool correctly balanced. Blades strained by thumb nut and screw stud, placed beneath the handle so as to allow maximum stroke; blades may be faced in four directions. Depth under back $3\frac{1}{2}$ inches. Weight, per dozen (with pasteboard boxes) $21\frac{1}{4}$ lbs.

Price, each, with one 10-inch blade..... \$3.10

"PISTOL GRIP" MILLERS FALLS

NO. 1027

Adjustable from 8 to 12 inches.

Same as No. 1011 but without scale on the back of the frame. Depth under back $3\frac{1}{4}$ inches. Weight per dozen (with pasteboard boxes) $17\frac{3}{4}$ lbs.

Price, each, with one 10-inch blade..... \$2.65

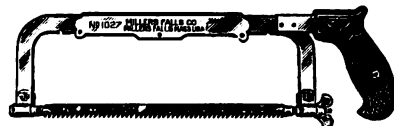


FIG. 445

GOODSELL-PRATT

NO. 69

Heavy. Fully polished and nickel plated. Adjustable from 8 to 12 inches.

This frame is made from $\frac{1}{4}$ x $\frac{3}{4}$ inch stock with a solid back and can be depended upon for rigidity even when fully extended. The two handles are polished hardwood. The blades can be faced in four different ways. Depth of throat $3\frac{1}{2}$ inches. Packed one in a box 16 x $4\frac{1}{4}$ x $1\frac{1}{4}$ inches. Weight $2\frac{1}{2}$ lbs.

Price, each, with one 8-inch blade..... \$3.00



FIG. 446

ADJUSTABLE HACK SAW FRAMES

UNIVERSAL "EASY GRIP" EXTENSION

NO. 12

Adjustable from 8 to 12 inches

Can be used to advantage as far as the arm can reach. In fact, it is just what the name implies, "Easy Grip." Extension features all retained. A rigid solid back with all the advantages possible. Full nickel plated. Small parts case hardened. Distance from bottom of frame to tooth edge of saw $3\frac{1}{8}$ inches. Body of frame $\frac{3}{4}$ inch by $\frac{1}{8}$ inch.

Price, each, without blade. \$3.00

FIG. 448

UNIVERSAL "EASY GRIP" EXTENSION

NO. 14

Similar to No. 12 but differs in that the handle is brought forward closer to the saw blade, and the housing for the body is extended $2\frac{1}{4}$ inches forward of the post. This construction insures more rigidity, and provides a frame of very great strength.

Price, each, without blade. \$3.75

FIG. 449

SOLID HACK SAW FRAMES

MILLERS FALLS

NO. 20

Capacity 8 and 9 inches

Rare tropical wood handle; polished and nickeled steel frame. Especially heavy and stiff stock, $\frac{1}{2} \times \frac{1}{8}$ inch. Blades strained by turning of the handle; may be faced in four directions. Knurled check nut, forced by a spring to overlap and hold blade in place while it is being inserted in the frame. Weight, per dozen, with pasteboard boxes, 16 lbs. Depth under back, $3\frac{1}{8}$ inches.

Price, each, with one 8-inch blade. \$2.05

FIG. 450

GOODELL-PRATT

NO. 14

Capacities 12, 13 and 14 inches

These frames are very heavy and will be found satisfactory by any one who has heavy sawing to do by hand. They are made of heavy steel $\frac{1}{4} \times 1$ inch with throats $5\frac{1}{4}$ inches deep. One blade furnished with each frame.

Price each.

No. 14	For 12-inch blades; Polished and Nickel Plated.	\$3.40
No. 14B	For 12-inch blades; Black Finish.	2.50
No. 67	For 13-inch blades; Polished and Nickel Plated.	3.00
No. 67B	For 13-inch blades; Black Finish.	2.40
No. 68	For 14-inch blades; Polished and Nickel Plated.	3.30
No. 68B	For 14-inch blades; Black Finish.	2.60

FIG. 452

MILLERS FALLS

NO. 14

For 12 inch blades

Extra heavy steel frame, polished and nickeled. Beechwood handle. Blade can be faced in four directions and is tightened by wing nut. Depth under back $10\frac{1}{4}$ inches. One blade furnished with frame Weight per dozen, 48 lbs.

Price, each, with one 12-inch blade. \$4.60

FIG. 453

VICTOR HACK SAW BLADES

VICTOR

FIG. 454

VICTOR NO. 1

ALL HARD FOR HAND FRAMES

For Cutting	Regular Stock Blade For General All-round Work	Brass	Iron Pipe	Drill Rod	Sheet Metals	LIST PRICE
		Copper	Tool Steel			
SIZE	Teeth Per Inch	Soft Steel	Hard Metals	Fine	Per Gross	
		Cast Iron	Light Angle Iron			
8" x 1/2" x .025	18	18	18	24	\$8.00	
9" x 1/2" x .025	18	18	18	24	9.00	
10" x 1/2" x .025	18	14	18	24	10.00	
12" x 1/2" x .025	18	14	18	24	12.00	
12" x 3/8" x .025	14	14	18		12.60	
14" x 5/8" x .028	14	14	18		16.20	

SPECIAL for Cutting Hard High Carbon RAILS

12" x 1/4" x .025 or 23 ga. 14 and 18 teeth Special AA No. 1

List Price Per Gross \$12.00

VICTOR NO. 2

SOFT BACK FLEXIBLE FOR HAND FRAMES

For Cutting	Regular Stock Blade For General All-round Work	Brass	Iron Pipe	Drill Rod	Thin	LIST PRICE
		Copper	Tool Steel		Electr. Casing	
SIZE	Teeth Per Inch	Soft Steel	Hard Metals	Fine	Tubing	Per Gross
		Cast Iron	Light Angle Iron			
8" x 1/2" x .025	18	18	18	24	32	\$8.00
9" x 1/2" x .025	18	18	18	24	32	9.00
10" x 1/2" x .025	18	14	18	24	32	10.00
12" x 1/2" x .025				24	32	12.00
12" x 3/8" x .025	18	14	18			12.00
14" x 5/8" x .028	14	14	18			16.20

Regular stock blades always furnished when length only specified.

All lengths given for hand blades measure from center to center of holes.

VICTOR NO. 4
ALL HARD POWER BLADES
FOR LIGHT POWER MACHINE WORK

For Cutting	Regular Stock Blade For General All-round Work	Copper	Light Angle Iron	LIST PRICE
		Steel Rails	Thin Metals	
SIZE	Teeth per Inch	Annealed Tool Steel	Tubing	Per Gross
		Iron Pipe		
10" x 3/4" x .032	14	14	18	\$13.50
12" x 5/8" x .032	14	14	18	14.40
14" x 3/4" x .032	14	14	18	16.20
		Cast Iron		
		Bronze & Brass		

VICTOR NO. 4

ALL HARD POWER BLADES
FOR HEAVY POWER MACHINE WORK
USE CUTTING SOLUTION WHEREVER POSSIBLE

For Cutting	Reg'l Stock Blade For Gen'l All-round Work	Iron Pipe	Steel Tubing	Heavy High Speed Machines run with Cutting Solution			LIST PRICE
		Soft Steel	Tool Steel	Mach. Steel	Tool Steel	Angle Iron	
SIZE	Teeth Per Inch	Cast Iron	Light Angle Iron	Soft Steel	Large Work	Small Work	Per Gross
		Hv Agl Iron	Hard Metals				
10" x 3/4" x .049	10	10	14				\$19.50
12" x 1 1/4" x .049	10	10	14				23.40
12" x 1 1/2" x .049	10	10	14	6	8		29.40
14" x 1 1/4" x .049	10	10	14	8	10		37.80
14" x 1 1/2" x .049	10	10	14	8	10		27.30
16" x 1" x .049	10	10	14	6	8		34.30
16" x 1 1/4" x .049	10	10	14	6	8		44.10
17" x 1 1/2" x .049	10	10	14	6	8		39.20
17" x 1 3/4" x .049	10	10	14	6	8		41.65
17" x 1 1/2" x .065	10	10	14	6	8		53.55
17" x 1 3/4" x .065	10	10	14	6	8		53.55
18" x 1 1/2" x .049	10	10	14	6	8		85.00
18" x 1 3/4" x .049	10	10	14	6	8		44.10
18" x 1 1/2" x .065	10	10	14	6	8		56.70
20" x 1" x .065	10	10	14	6	8		56.70
24" x 1 1/2" x .049	10	10	14	6	8		63.00
24" x 1 3/4" x .049	10	10	14	6	8		99.60
24" x 1 1/2" x .065	10	10	14	6	8		75.00
24" x 1 3/4" x .065	10	10	14	6	8		120.00

When length only is specified we will furnish power blades up to and including 14", .032 thick. Longer lengths up to 24", .049 thick. 24" and longer, .065 thick. Length of No. 4 Power Blades measure from center to center of holes, excepting 14" and 17" lengths, these measure 13 1/2", and 16 1/2".

Regular stock blades always furnished when length only specified.

MILFORD HACK SAW BLADES

MILFORD

FIG. 455

FOR HAND FRAMES

HEAVY GRAVITY AND POSITIVE FEED MACHINE SIZES

Length Inches	Width Inches	Thickness Gauge	Teeth per Inch				List Prices Per Gross
			Reg- ular	Med- ium	Fine	Tub- ing	
6	7-16	.025 or 23	18	—	22	32	\$7.00
7	7-16	.025 " 23	18	—	22	32	7.50
8	7-16	.025 " 23	18*	—	22	32	8.00
9	7-16	.025 " 23	18*	—	22	32	9.00
10	1-2	.025 " 23	14	18	22	32	10.00
11	1-2	.025 " 23	14	18	22	32	11.00
11	9-16	.028 " 22	14	18	22	32	11.40
12	1-2	.025 " 23	14	18	22	32	12.00
12	9-16	.028 " 22	14	18	22	32	12.60
13	9-16	.028 " 22	14	18	22	32	13.80
14	9-16	.028 " 22	14	18	22	32	15.00

*Also furnished with 14 teeth if so specified.

HAND OR LIGHT GRAVITY FEED MACHINE SIZES

Length Inches	Width Inches	Thickness Gauge	Teeth per Inch			List Prices Per Gross
			Reg- ular	Fine	Tub- ing	
8	9-16	.028 or 22	14	22	32	\$9.00
9	9-16	.028 " 22	14	22	32	9.60
10	9-16	.028 " 22	14	22	32	10.20
10	5-8	.028 " 22	14	22	32	10.20
11	9-16	.028 " 22	14	22	32	11.40
11	5-8	.028 " 22	14	22	32	11.40
12	9-16	.028 " 22	14	22	32	12.60
12	5-8	.028 " 22	14	22	32	12.60

Explanation as to the proper number of teeth to use in cutting the various grades of metal:

REGULAR: For cutting Soft Steel, Cast Iron, etc.

MEDIUM: (For hand frame use) for cutting Tool Steel and High Carbon Rails.

FINE: For cutting Solid Brass, Iron Pipe, Heavy Tubing, etc.

TUBING: For cutting Thin Tubing and Thin Sheet Metals.

Length Inches	Width Inches	Thickness Gauge	Teeth per Inch				List Prices
			Stock Size	Also made with			Per Gross
10	3-4	.032 or 21	14				\$13.50
10	3-4	.049 " 18	10	12	14	22	19.50
10	1	.032 " 21	14			22	19.00
10	1	.049 " 18	10	12	14		24.50
12	5-8	.032 " 21	14			22	14.40
12	3-4	.032 " 21	14			22	16.20
12	3-4	.042 " 19	12	10	14		21.00
12	3-4	.049 " 18	10	12	14		23.40
12	1	.032 " 21	14			22	22.80
12	1	.042 " 19	12	10	14		27.00
12	1	.049 " 18	10	8	12	14	29.40
14	5-8	.032 " 21	14			22	16.80
14	3-4	.032 " 21	14			22	18.90
14	3-4	.042 " 19	12	10	14		24.50
14	3-4	.049 " 18	10	12	14		27.30
14	1	.032 " 21	14			22	26.60
14	1	.042 " 19	12	10	14		31.50
14	1	.049 " 18	10	8	12	14	34.30
14	1¼	.049 " 18	10	4	6	8	44.10
16	3-4	.032 " 21	14			22	21.60
16	3-4	.049 " 18	10	12	14		31.20
16	1	.049 " 18	10	12	14		39.20
16	1	.056 " 17	10	8	12		44.80
16	1	.065 " 16	10	8			50.40
16	1¼	.049 " 18	10	4	6	8	50.40
17	3-4	.032 " 21	14			22	22.95
17	3-4	.049 " 18	10	12	14		33.15
17	1	.042 " 19	12	10	14		38.25
17	1	.049 " 18	10	8	12	14	41.65
17	1	.056 " 17	10	8	12		47.60
17	1	.065 " 16	10	8			53.55
17	1½	.065 " 16	10	4	6	8	85.00
18	1	.049 " 18	10		14		44.10
18	1	.056 " 17	10				50.40
18	1	.065 " 16	10	8			56.70
19	1	.049 " 18	10		14		46.55
19	1	.056 " 17	10				53.20
19	1	.065 " 16	10	8			59.85
19	1½	.065 " 16	10	4	6	8	95.00

HEAVY GRAVITY AND POSITIVE FEED MACHINE SIZES

Length Inches	Width Inches	Thickness Gauge	Teeth per Inch			List Prices Per Gross		Length Inches	Width Inches	Thickness Gauge	Teeth per inch			List Prices Per Gross
			Stock Size	Also made with							Stock Size	Also made with		
20	1	.049 or 18	10		14	\$49.00		23	1	.049 or 18	10		14	\$56.35
20	1	.056 " 17	10			56.00		23	1	.056 " 17	10			64.40
20	1	.065 " 16	10	8		63.00		23	1	.065 " 16	10	8		72.45
21	1	.049 " 18	10		14	51.45		24	1	.049 " 18	10		14	58.80
21	1	.056 " 17	10			58.80		24	1	.056 " 17	10			67.20
21	1	.065 " 16	10	8		66.15		24	1	.065 " 16	10	8		75.60
21	1½	.065 " 16	10	4	6	8	105.00							
22	1	.049 " 18	10		14	53.90		24	1½	.065 " 16	10	8		120.00
22	1	.056 " 17	10			61.60		27	1½	.065 " 16	10	8		135.00
22	1	.065 " 16	10	8		69.30		30	1½	.065 " 16	10	8		150.00
							

NOTE.—Number of Teeth in STOCK SIZE will be supplied unless otherwise specified.
 All blades 14 inches and over (except those over 1 inch in width) measure 1/2 inch less between centers of holes than lengths given.
 Saws with special temper supplied for HIGH SPEED MACHINE use, upon request.

MARVEL DRAW CUT HACK SAWS

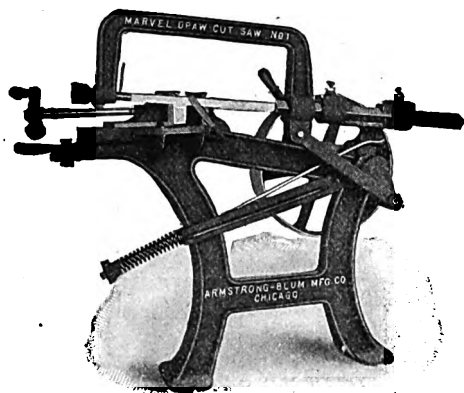


FIG. 457

NO. 1

A highly improved durable saw for general shop use. Quick acting vise. Very low price. In use all over. Capacity 4"x4".

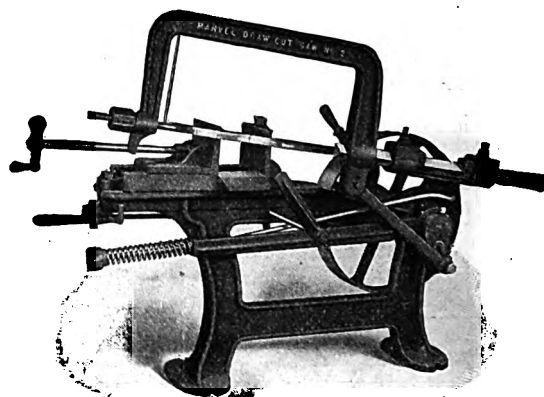


FIG. 458

NO. 2

Large capacity for general work. Vise swivels to either right or left angle and is quick acting. Low price. Capacity to 8"x8".

HEAVY AND EXCEPTIONALLY RIGID IN CONSTRUCTION

Fitted with quick action vise that saves times. A device that raises or lowers saw and holds it at any desired angle, allowing free use of both hands in measuring material.

The wear can be taken up to any extent in the two saw bearings, which have also receptacles for oiled waste. Drive shaft has bronze bearings.

Starter and automatic stop are at front of machine.

No. 2 has adjustable stroke—Longest 6¾ inches; shortest, 4 inches.

PRICE LIST AND DIMENSIONS

CAPACITY	Length of Blade	RPM	Weight lbs.	Price
No. 1. 4 in. x 4 in.	12 in.	60—90	110	.....
No. 2. 6 in. x 6 in. on long stroke; 8 in. x 8 in. on short stroke.	12—17 inch	50—70	260	.....

PEERLESS HIGH SPEED METAL SAWS

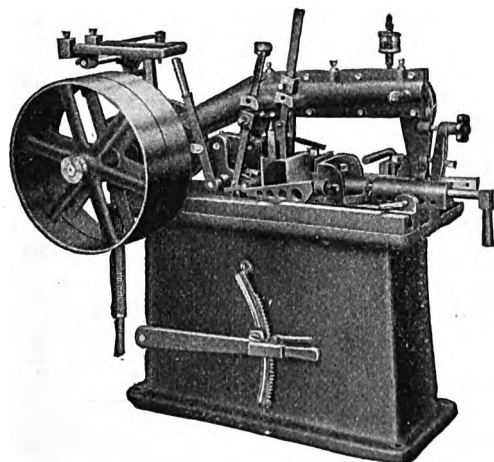


FIG. 3940

6 x 6—REGULAR BELT DRIVEN. LEFT HAND VIEW.

Can be furnished either belt or motor driven, with or without motor and 6-speed gear box.

The **automatic feed** is obtained by a spring carefully designed to give a uniform pressure to the blade throughout the entire cut. Any desired pressure up to a maximum of 175 pounds may be instantly obtained by the simple manipulation of a conveniently placed lever controlling the feed spring. **A spring for this purpose is far superior to weights;** weights rebound at high speed, breaking blades; weights are misplaced when not in use; weights put an uncushioned dead load on the blade.

For specifications see page 153.

PEERLESS HIGH SPEED METAL SAWS

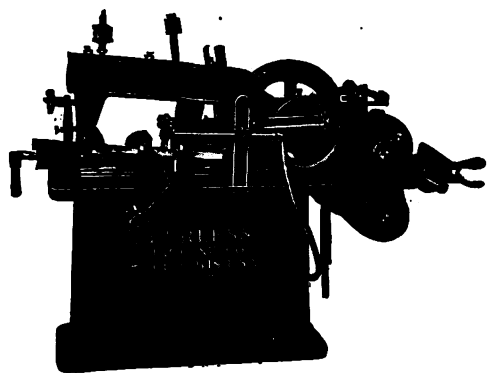


FIG. 3941

9x9 AND 13x16 REGULAR BELT DRIVEN. RIGHT HAND VIEW.

The saw frame cannot fall and break the blade. If an operator starts the machine with the frame at its highest point the machine will feed down onto the work in the regular way and no damage can occur. Under similar circumstances a heavy weighted frame would drop, resulting in blade breakage. This is one of the several features making the Peerless High Speed fool-proof.

In general you will find that the Peerless High Speed is designed throughout for long life and efficiency. Special attention is invited to the ruggedness of design; there are no complicated mechanisms nor delicate parts. The tool is so nicely designed and constructed that even though it is capable of the very heaviest work, still no degree of sensitiveness has been sacrificed.

The automatic lifting device is actuated by a spring. A cam movement automatically throws the spring into operation upon each return stroke, allowing the blade to clear the work. The same spring also serves to return the saw frame to its highest point after the cut has been completed. This action is entirely automatic, requiring no attention from the operator. It avoids the necessity of the operator lifting a heavily weighted saw frame after each cut. This one labor-saving feature alone insures increased production.

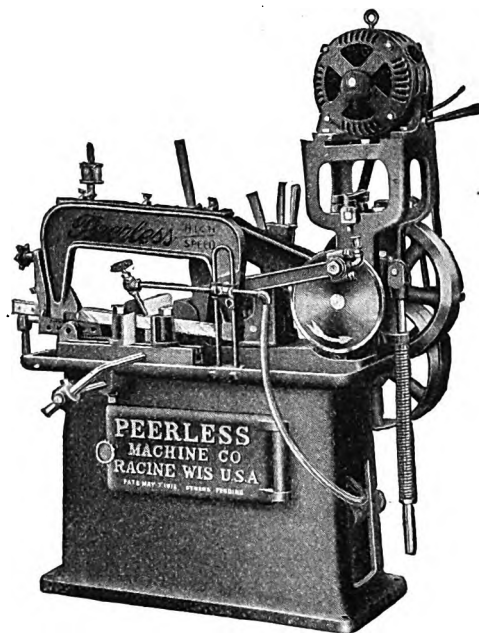


FIG. 3942

6x6 MOTOR DRIVEN. RIGHT HAND VIEW.

SPECIFICATIONS

Nominal capacity.....	6" x 6"	9" x 9"	13" x 16"
Actual capacity.....	6 3/8" x 6 3/8"	9 1/2" x 9 1/2"	13 1/2" x 16 1/8"
Blade length.....	10" to 14"	10" to 17"	12" to 24"
Stroke.....	6"	6"	6"
Pulley, regular belt driven.....	3" x 16"	2 1/2" x 8"	3" x 8"
Pulley, 6 speed, quick change gear box.....	3" x 16"	2 1/2" x 8"	3" x 8"
Pulley, motor driven and 6 speed.....	2" x 12"	2 1/2" x 16"	3" x 16"
Height, floor to vise.....	22"	21"	21"
Floor space.....	22" x 44"	26" x 66"	30" x 92"
Net weight.....	585 lbs.	1000 lbs.	1650 lbs.
Shipping weight.....	635 lbs.	1185 lbs.	1875 lbs.
Belt driven.....			
Belt driven with six speed gear box.....			
Arranged with motor mountings.....			
Arranged with motor mountings and six speed gear box.....			
*Motor (AC) driven.....	Prices upon application.	Prices upon application.	Prices upon application.
*Motor (AC) driven with six speed gear box.....			
*Motor (DC) driven.....			
*Motor (DC) driven with six speed gear box.....			
Motor mountings when furnished as a separate unit.....			
Six speed gear box when furnished as a separate unit.....			
*Size of motor furnished, H. P.....	1	1 1/2	2

*AC motors two or three phase, 110, 220, 440 or 550 volts, 50 or 60 cycle.

*DC motors 110 or 220 volts.

Belt and pulley are not furnished when motor mountings are sold as a separate unit.

Motor driven machines are speeded at 125 r. p. m. unless otherwise specified. Always state current conditions when ordering.

KWIK KUT HACK SAW MACHINES

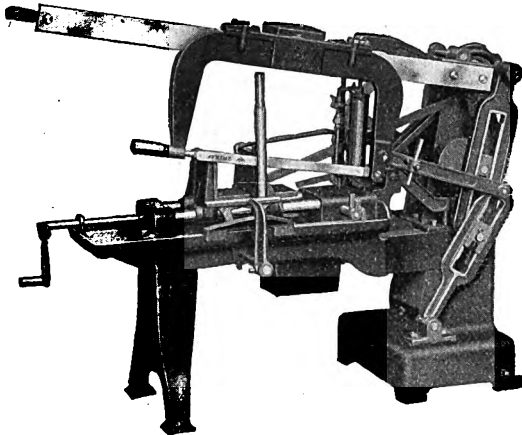


FIG. 459

BELT DRIVEN MACHINES

The Kwik Kut Hack Saw Machine will cut at least 25 per cent. faster on average cuts than any other Hack Saw Machine of equal capacity at any price. Manufactured under an exclusive patent whereby the length of the stroke is automatically regulated by the size of the material in vise, thus securing the maximum cutting efficiency from each stroke. This feature, together with other advantages mentioned below, accounts for the rapid cutting qualities and insures a saving of from 25 to 100 per cent in blades.

A Raising Device lifts the Saw Arm on the return or non-cutting stroke.

A most effective Lubricating System.

Two Speed Pulley varies the stroke of the Saw Arm from 50 to 80 per minute.

Automatic stop, stops the machine at any desired depth in cut, also when cut has been completed.

Equipped with patented saw guide insuring extreme accuracy.

No.	DESCRIPTION	Capacity	Shipping Weight
12-K	Solid Vise 1 speed.....	4" x 4"	350
12-S	Swivel Vise 1 speed.....	4" x 4"	350
14-K	Solid Vise 1 speed.....	6" x 6"	400
14-S	Swivel Vise 1 speed.....	5" x 6"	400
7-K	Solid Vise 2 speeds.....	8" x 8"	700
7-S	Swivel Vise 2 speeds.....	7" x 8"	700

Prices on application.

(*) The capacity given is the size of stock which the Vise will accommodate when cutting straight. When turned to an angle of 45° the capacities are, No. 12-S, 2½" x 4"; No. 14-S, 3½" x 6"; No. 7-S, 4½" x 8".

MOTOR DRIVEN MACHINES, COMPLETE

All voltages mentioned are standard but will operate on motors rated 15% higher or lower. The prices on DC Variable Speed Motor Driven Machines include 110, 220, and 550 volts. The AC Constant Speed prices include either single or polyphase 25 or 60 cycles, 110 and 220 volts. All Motor Driven Machines are regularly equipped with special sprocket, pinion, and chain drive. We also furnish the AC Constant Speed Motor Driven Machine when required with back geared motor and connected by leather belt with a two-step pulley connecting with the cone pulley on the machine providing for 2 speeds. (See footnote regarding Variable Speed AC drives.) If different motor equipment from any mentioned is required, write for prices and information.

No.	DESCRIPTION	Capacity	Shipping Weight
7EK	Solid Vise, DC Variable Speed or AC Constant Speed.....	8" x 8"	850
7ES	Swivel Vise, DC Variable Speed or AC Constant Speed.....	7" x 8"	850
7EKV	Solid Vise, AC Variable Speed, 110-220 volts, 25-60 cycles.....	8" x 8"	850
7ESV	Swivel Vise, AC Variable Speed, 110-220 volts, 25-60 cycles.....	7" x 8"	850
7EKH	Swivel Vise, AC Variable Speed for voltages higher than 250, 25-60 cycles with transformer (see footnote).....	8" x 8"	925
7ESH	Swivel Vise AC Variable Speed, for voltages higher than 250, 25-60 cycles with transformer (see footnote).....	7" x 8"	925

Prices on application.

*The capacity given is the size of stock which the vise will accommodate when cutting straight. When turned to an angle of 45 degrees, the capacity is 4½" x 8".

NOTE: The AC Variable Speed Motors have the same characteristics as the DC Variable Speed, but when required in connection with 440 to 500 volt circuit a transformer is necessary. The additional charge for this type is to cover the price of the transformer only.

MACHINES EQUIPPED FOR MOTOR DRIVE WITHOUT MOTOR

No.	DESCRIPTION	Capacity	Shipping Weight
7KC	Solid Vise, equipped with motor bracket, chain sprockets, chain, guard, but without motor, controller or switch.....	8" x 8"	750
7KP	Solid Vise, equipped with motor bracket, and two-step cone pulley to connect with cone pulley on machine, but without motor, controller or switch.....	8" x 8"	750
7SC	Swivel Vise, equipped with motor bracket, chain, sprockets and chain guard, but without motor, controller or switch.....	7" x 8"	750
7SP	Swivel Vise, equipped with motor bracket and two-step cone pulley to connect with cone pulley on machine but without motor, controller or switch.....	7" x 8"	750

Prices on application.

*The capacity given is the size of stock which the vise will accommodate when cutting straight. When turned to an angle of 45 degrees, the capacity is 4½" x 8".

STAR HACK SAW BLADES



FIG. 466

Made with 14 and 24 teeth to the inch. Blades with 14 teeth to the inch are ADAPTED TO ALL KINDS OF HACK SAW WORK AND MATERIALS except thin stock and tubing with thin walls, for which blades with 24 teeth should be used. BLADES WITH 14 TEETH TO THE INCH ARE SUPPLIED UNLESS 24 TEETH OR "FINE" IS SPECIFIED.

FOR HAND FRAMES

Size (inches)	Teeth per inch	Weight per gross (lbs.)	Price, per gross
6x $\frac{1}{2}$ x.025 or 24 Ga.	14 18 24	2 $\frac{3}{4}$	\$7.00
7x $\frac{1}{2}$ x.025 "	14 18 24	3	7.50
8x $\frac{1}{2}$ x.025 "	14 18 24	3 $\frac{1}{4}$	8.00
9x $\frac{1}{2}$ x.025 "	14 18 24	3 $\frac{1}{2}$	9.00
10x $\frac{1}{2}$ x.025 "	14 18 24	4 $\frac{5}{8}$	10.00
11x $\frac{1}{2}$ x.025 "	14 18 24	5	11.00
12x $\frac{1}{2}$ x.025 or 23 Ga.	14 18 24	5 $\frac{1}{2}$	12.00
14x $\frac{1}{2}$ x.030 Spec.Ga.	14	8 $\frac{1}{4}$	15.00

POWER HACK SAW BLADES

The following sizes cover full range of requirements:—

Size (inches)	Teeth per inch	Weight per gross (lbs.)	Price per gross
12x $\frac{5}{8}$ x.032	14	10	\$14.40
12x $\frac{3}{4}$ x.032	14	13	16.20
12x $\frac{3}{4}$ x.049	10	15 $\frac{3}{4}$	23.40
12x 1 x.049	10	25	29.40
14x $\frac{3}{4}$ x.032	14	14	18.90
14x $\frac{3}{4}$ x.049	10	18	27.30
14x $\frac{3}{4}$ x.049	14	18	27.30
14x 1 x.049	10	28	34.30
14x 1 x.065	10	36	44.10
16x 1 x.049	10	34	39.20
17x 1 x.049	10	34	41.65
17x 1 x.065	10	45	53.55
18x 1 x.049	10	37 $\frac{1}{2}$	44.10
18x 1 x.065	10	43	56.70
21x 1 x.049	10	44	51.45
24x 1 x.049	10	48	58.80
24x 1 x.065	10	63	75.60

.032 .049 .065
21 18 16 Gauge

SCREW SLOTTING SAW BLADES

NO. 249



FIG. 3943

These blades are made for cutting slots in screw heads and can be used in any adjustable or 8 inch hack saw frame. They are hardened throughout, have 14 teeth to the inch, and taper in thickness from the teeth to the back, thus providing good clearance, which prevents binding and allows the blades to cut easily and quickly.

All blades are 8 inches long by $\frac{1}{2}$ inch wide. They are made in four different thicknesses, covering a wide range of work, and will be found invaluable in any machine shop.

Packed three dozen of one thickness in a box, also in sets of four, consisting of one blade of each thickness, twelve sets to a carton.

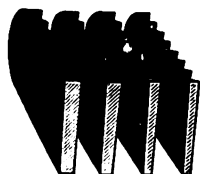


FIG. 3944

Number	Approximate Thickness at Teeth	Prices	
		Per Dozen	Per Gross
249A	.049 inch	\$2.10	\$25.20
249B	.065 "	2.40	28.80
249C	.083 "	2.70	32.40
249D	.109 "	3.00	36.00
249E	Set of four blades, one of each thickness, per set		.85

PLIERS

PEXTO LONG NEEDLE NOSE

NO. 66

Long straight nose, lap joint, forged steel. Gun barrel handles 5½ inches; jaws 1½ inches.

Price each.....\$1.00



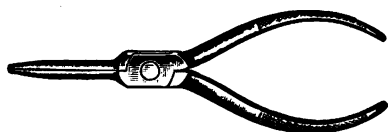
NO. 66—FIG. 460

KRAEUTER LONG FINE NEEDLE NOSE

NO. 1621

Nose finely tempered. Kraeuter full polished knurled handles that fit the hand. Especially made for the difficult and odd jobs where no other plier will answer.

6-inch, price each.....\$2.15



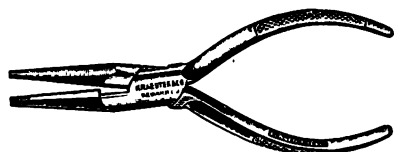
NO. 1621—FIG. 461

KRAEUTER NEEDLE NOSE SIDE CUTTING

NO. 1661

A very slender nose cutting plier. Points nicely tapered to a practical fineness, making it a universal fine point tool. This popular 6-inch fine point plier has hole in handle to fasten to belt. Kraeuter full polished knurled handles that perfectly fit the hand. Size, 6 inches.

Price each.....\$2.20



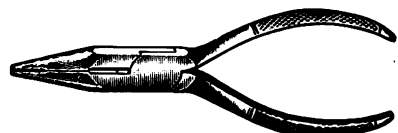
NO. 1661—FIG. 462

KRAEUTER NEEDLE POINT WITHOUT CUTTERS

NO. 1671

Kraeuter full polished knurled handles. Length, 6 inches.

Price each.....\$1.80



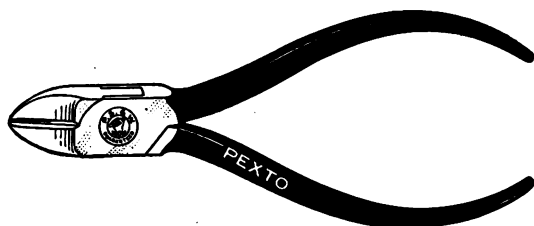
NO. 1671—FIG. 463

PEXTO DIAGONAL CUTTING

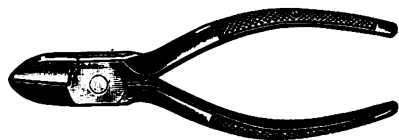
NO. 27

Box joint, diagonal cutting, Swedish pattern. Made from the highest grade of crucible steel. Has a box joint, polished head; a tool of the highest merit. Gun barrel handles.

Inches.....	4½	5	6
Price each.....	\$1.00	\$1.25	\$1.40



NO. 27—FIG. 464

PLIERS

NO. 2601—FIG. 465

KRAEUTER DIAGONAL SIDE CUTTING

NO. 2601

Forged steel, Krauter full polished knurled handles.

Length, inches.....	5	5½	6
Price each.....	\$1.90	\$2.05	\$2.50



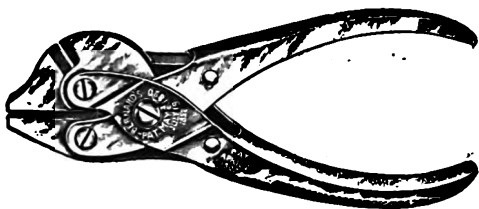
NO. 30—FIG. 466

PEXTO SIDE-CUTTING

NO. 30

Forged crucible steel, box joint, polished head, knurled gun barrel handles.

Inches.....	5	6	7	8
Price each.....	\$1.25	\$1.35	\$1.70	\$2.00



NO. 102—FIG. 467

BERNARD SIDE-CUTTING

NO. 102

Warranted crucible steel, open throat, parallel jaws, full nickel-plated.

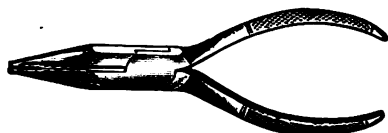
Inches.....	4½	5	5½	6	6½	7	8
Price each.....	\$1.25	\$1.55	\$1.70	\$1.90	\$2.00	\$2.40	\$2.75

BERNARD SIDE-CUTTING

NO. 102½

Same design as No. 102 but will cut tempered steel wire.

Size 5½ inch, Price each.....	\$1.70
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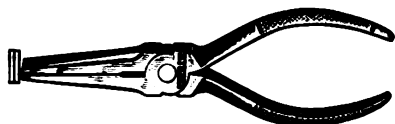
NO. 1721—FIG. 468

KRAEUTER ELECTRICIAN'S LONG NOSE SIDE-CUTTING

NO. 1721

This plier has a long slender nose, scored jaws and is made with a semi-flat point ½ inch wide. It is especially adapted for fine wire work and has a side cutter that remains sharp. Furnished with holes in handles to fasten to belt. Krauter full polished knurled handles. Size, 6 inches.

Price each.....	\$2.15
-----------------	--------



NO. 1751—FIG. 3946

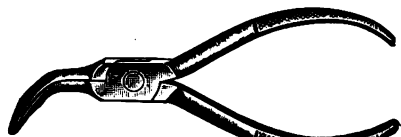
KRAEUTER LONG REACH SIDE CUTTING

NO. 1751

Extra long reach, flat nose, side-cutting pliers with knurled handles. Size, 6 inches.

Price, each.....	\$2.20
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PLIERS



NO. 1631—FIG. 472

KRAEUTER CURVED NEEDLE NOSE

NO. 1631

Krauter full polished knurled handles. Spring tempered with nose well designed for odd and difficult jobs.

Size 5½ inches. Price each.....\$2.25



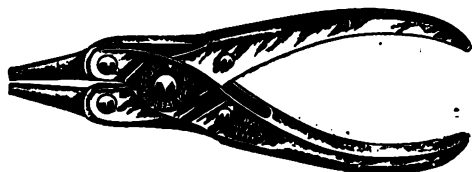
NO. 67—FIG. 473

PEXTO CURVED NOSE, LAP JOINT FORGED STEEL

NO. 67

Gun barrel handles, 5½ inches; curve ⅞-inch.

Price each.....\$1.35



NO. 101—FIG. 474

BERNARD ROUND NOSE

NO. 101

Crucible steel, open throat, parallel jaws, closed in scored handles, full nickel plated.

Inches.....	4½	5	5½	6	6½	7	8
Price each.....	\$0.60	\$0.70	\$0.80	\$0.90	\$1.00	\$1.10	\$1.40



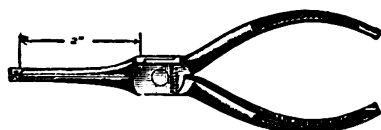
NO. 43—FIG. 475

PEXTO CHAIN NOSE

NOS. 43 AND 47

Forged from a high grade crucible steel, have polished jaws and box joint. Designed to meet the most exacting demand of the jeweler or optician, for whose use they are especially intended. Gun barrel handles.

Inches.....	4	4½	5
Jaws, inches.....	⅜	1	1½
Price No. 43, Smooth jaws, each.....	\$1.25	\$1.35	\$1.50
Price No. 47, File Jaws, each.....	1.25	1.35	1.50



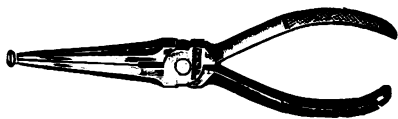
NO. 1651—FIG. 3945

KRAEUTER SLENDER NOSE FLAT THIN JAW

NO. 1651

Known as weavers' and knitters' pliers. Very useful where a slender nose with flat jaws is serviceable. Furnished with holes in handles to fasten to belt. Krauter full polished knurled handles. Size, 6 inches.

Price, each.....\$2.00

PLIERS**KRAEUTER VERY LONG REACH FLAT NOSE SIDE CUTTING
NO. 1781****NO. 1781—FIG. 469**

The illustration conveys a faint idea of the many uses of this plier. The long slender jaws enable one to reach far beyond the capacity of the ordinary plier. Cutting edges are high grade, jaws are scored. Krauter full polished knurled handles that fit the hand. Size, 7 inches.

Price, each..... \$2.40

**KRAEUTER ELECTRICIAN'S
NO. 1831****NO. 1831—FIG. 4020**

Forged of special plier steel scientifically tempered and carefully machined, beveled nose with knurled handle. Bright finish.

Size, inches.....	4	5	6½	7	8
Price, each.....	\$1.50	\$1.55	\$1.70	\$2.00	\$2.25

**KRAEUTER LINEMAN'S HEAVY SIDE CUTTING
NO. 1801****NO. 1801—FIG. 470**

Lap joint, forged steel. Krauter full polished knurled handles. Regular cutter.

Size, inches.....	6	7	8½
Price, each.....	\$2.20	\$2.60	\$3.05

**KRAEUTER LINEMAN'S "DREADNAUGHT" SIDE CUTTING
NO. 2801****NO. 2801—FIG. 471**

Handles are fancy checkered, extra heavy polished jaws for hardest usage. Lap joint, raised cutter, beveled nose.

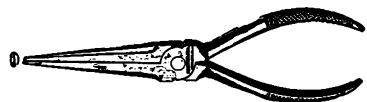
Size, inches.....	6	7	8½
Price, each.....	\$2.85	\$3.20	\$3.90

KLEINS SIDE CUTTING**FIG. 3947**

Forged from high-grade tool steel. Tempered and polished jaws. Natural finish handles with checkered grips. Lap joint with heavy rivet. Raised side cutters.

Numbers.....	201-6	201-7	201-8	202-9
Size, inches.....	6	7	8	9
Price, each.....	\$3.00	\$3.50	\$4.00	\$5.00

PLIERS

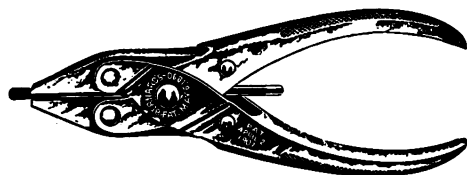
KRAEUTER VERY LONG REACH FLAT NOSE WITHOUT CUTTERS
NO. 1771

NO. 1771—FIG. 476

Made with long slender jaws to obtain an unusual reaching capacity. Especially adapted to use where the ordinary chain, needle nose, or electrician's plier would be short in reach. Kraeuter full polished knurled handles.

Size, 7 inches.

Price, each.....\$2.10



NO. 100—FIG. 477

BERNARD FLAT NOSE
NO. 100

Crucible steel, open throat, parallel jaws, closed in scored handles, full nickel plated.

Size, inches.....	4½	5	5½	6	6½	7	8
Price, each.....	\$0.60	\$0.70	\$0.80	\$0.90	\$1.00	\$1.10	\$1.40



FIG. 3948

MOTOR KIT COMBINATION

This is a high-grade hand-finished tool. The handles are drop-forged from fifty carbon open hearth steel, hardened and oil drawn. Bolt and nut are turned from the solid bar of cold rolled steel and case hardened. All holes are drilled and teeth milled. Has checker dot handles, wire cutter and screw driver.

Number.....	G25	G26	G28	G210
Size, inches.....	5	6	8	10
Capacity, inches.....	¾	1	1½	1½
Price, each.....	\$0.35	\$0.35	\$0.50	\$0.70

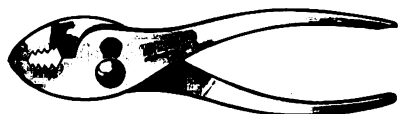


FIG. 484

CEETEECO COMBINATION
Nickel Finish

This is a high grade tool, drop-forged from 50 Carbon Open Hearth Steel machine finished which meets the demand for a guaranteed tool at a low price.

Size.....	inches	5	6
Capacity.....	"	¾	1
Price.....	each	\$0.35	\$0.35



B. & S. 5, 6 AND 8 IN.—FIG. 485



B. & S. 10 AND 14 IN.—FIG. 486

BILLINGS AND SPENCER IMPROVED COMBINATION
MODEL M

Drop-forged of selected open-hearth steel and hardened. A powerful wire cutter is located near the bolt of the plier. By its use a one-eighth wire may be cut with ease.

No.....	0	1	2	3	4
Size, inches.....	5	6	8	10	14
Holds pipe, inch.....	1-5/8	1-3/4	1-3/4	1-1/2	1-1/4
Nickel plated, price, each.....	\$1.00	\$1.25	\$1.50	\$1.75	\$2.50
Black finish, price, each.....	.85	1.15	1.35	1.50	2.00

PLIERS

KRAEUTER NEW COMBINATION SLIP JOINT

NO. 356

Made of highest grade plier steel, slip joint. Has wire cutter in front. Knurled handles, full nickel plated.

Length	inches	5½	6	8	10
Price.....	each	\$1.05	\$1.20	\$1.50	\$1.80



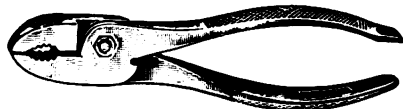
NO. 356—FIG. 487

KRAEUTER SLIP JOINT SIDE CUTTING

NO. 1873

Made of special analysis steel with two wire cutters. Knurled handles, full nickel plated.

Length	inches	7
Price.....	each	\$1.90



NO. 1873—FIG. 488

KRAEUTER THIN NOSE COMBINATION

NO. 1903

The long thin nose and tapered jaws on this plier enables the user to reach small inserted objects difficult to grip and stubborn to wrench. Has two forms of milled teeth, with screw-driver and wire-cutter, giving it a wide range of usefulness. Forged of special plier steel, perfectly tempered and finely machined and fitted. Made with Krauter "Don't Slip" knurled handles. Full Nickel-Plated.

Size	inches	7
Price.....	each	\$1.45



NO. 1903—FIG. 489

KRAEUTER BENT NOSE COMBINATION

NO. 1923

The plier for the odd, difficult places to reach. This tool is very practical on angle work and for deep reaching, taking a full grip without danger of bruising the hand. The 10-inch size is pictured. The 8-inch size being made for smaller objects, is furnished with a flat nose and a square hole for units. Both sizes made with handle screw-driver, forged of special plier steel, correctly tempered and finely fitted. A superior tool with Krauter "Don't Slip" knurled handles. Full nickel plated.

Sizes	inches	8	10
Price	each	\$1.75	\$2.10



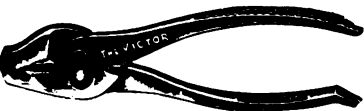
NO. 1923—FIG. 490

"VICTOR" UNIVERSAL

NO. 305

Distinctly a high-grade tool—in quality, its utility and finish. Forged from high carbon steel, accurately machined and correctly finished with knurled handles. A 7-inch plier that is absolutely guaranteed and will do the work of any 10-inch plier and do it better. Wire-cutter on the handle side of fulcrum. The upper jaw is so constructed that the jaws will adjust themselves to any taper—half-round, round, three-square or parallel. The flat side always lays itself to the lower jaw, which is straight. This construction gives this plier double the strength of any other similar plier. This unique plier will grip a pipe ¾-inch to 1¼ inches in diameter. The harder you press or pull, the deeper it bites—the position of the teeth does it. It will take a never-let-go hold of a rod. The wire-cutter on the handle side has a great leverage and is very serviceable. This plier will do all the work of a parallel plier and will take all tapers which such a plier will not. Krauter "Don't Slip" knurled handles. Full nickel plated.

Size	inches	7
Price	each	\$1.35



NO. 305—FIG. 491



NO. 305—FIG. 492

PLIERS

V & B NUT



FIG. 3949

Designed for use on nuts and bolts. Will not mash the nuts. Polished jaws. Black painted handles. Wire cutter.

Number	3	5
Size, inches	6	7
Holds nuts from in. O. D.	$\frac{1}{8}$ x $\frac{5}{8}$	$\frac{1}{4}$ x 1
Price, each.	\$0.50	\$0.60

KRAEUTER "GRIPKUT" COMBINATION

NO. 1973

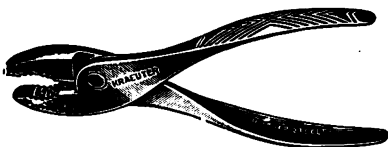


FIG. 3950

Most complete all-around plier for all mechanics. The scored teeth in the jaws insure a firm hold on a piece of steel or pipe with little pressure. The very useful little groove in the jaws is for holding pins and shoving cotter pins in place. Handles are wider than head of pliers permitting a firm and more comfortable grip. Cutting edges will cut copper wire as well as wire nails. Depressed bolt-head. Full nickel plated with "Don't Slip" Handle.

Size, inches	5½	7
Price, each.	\$1.60	\$2.00

KLEINS SPLICING CLAMPS

NO. 102-3

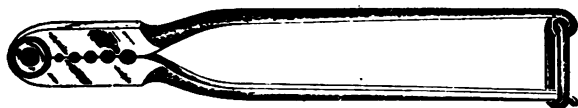


FIG. 3951

Covers a wide range of wires. Large hole can also be used in serving guy wire or messenger strand. Has five round holes accommodating iron wire Nos. 6, 8, 10, 12 and 14 and copper wire Nos. 6, 8, 10 and 12. Polished heads and black handles. Size, 10½ inches.

Price, per pair	\$3.50
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KLEINS COMBINATION WIRE AND SLEEVE CLAMPS

NO. 132-3

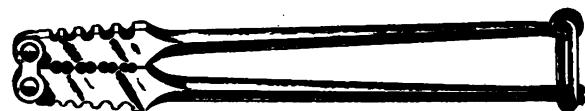


FIG. 3952

Covers the range of bare wires telephone and telegraph line usually handle. The large hole also can be used in serving guy wire or messenger strand. Has five round holes which will accommodate all sizes of iron wire Nos. 6 to 14 B. W. G., and all sizes of copper wire Nos. 4 to 12 B. & S. gauge. The reverse side has four sets of chambers adapted for twisting double tube copper sleeve joints Nos. 8 to 14 B. & S. gauge, and iron sleeve joints Nos. 10 to 16 B. W. G.

Polished heads and black handles. Size, 10¾ inches.

Price, per pair	\$4.00
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KLEINS HAVEN'S STEEL GRIP

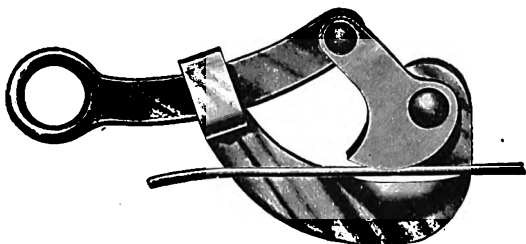


FIG. 3953

A popular grip for all-around work. Forged from crucible tool steel. The eccentric or dog is hand cut, hardened and tempered. All rivets are steel machine turned. Almost automatic in action. The handle and the eccentric allows instantaneous hold. A shake of the rope on the tackle disengages and releases the grip. It will not slip, heavy strain only making it grip the tighter.

Numbers	1604-10	1604-20
Size	No. 8 wire and finer	½" wire and finer
Price, each	\$3.50	\$4.50

NIPPERS

STARRETT ADJUSTABLE JAW-CUTTING

Head and handles drop-forged steel, finely finished. All parts case-hardened, except the jaws, which are properly tempered for their work. Jaws are detachable and can be ground and replaced.

The 5½ inch nippers open ⅛ inch, and the 7 inch open ⅜ inch.

Note.—The 5½ inch size are made with jaws held in place by one screw, whereas the 7 inch size are fitted with two screws.

Inches.....	5½	7
No. 1C, for common use, each.....	\$2.75	\$3.25
No. 1M, for music wire, each.....	2.75	3.25
No. 1B, for bicycle use, each.....	2.75	3.25
Extra jaws, pair.....	.50	.50
Extra screws, dozen.....	.25	.25
Extra splines, dozen.....	.25	.25

Unless otherwise ordered, Cut-Nippers with M jaws will be sent.

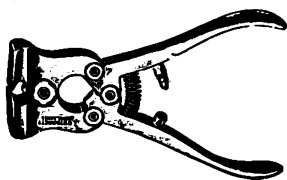


FIG. 480

CAREW END-CUTTING

Forged steel, adjustable tempered tool steel jaws, polished head, black handles.

Numbers.....	8	10	12	14
Size, inches.....	8	10	12	14
Price per pair.....	\$3.80	\$4.25	\$4.90	\$5.70
Extra cutters, pair.....	1.05	1.15	1.25	1.35
Extra set screws, each.....	.25	.25	.25	.25

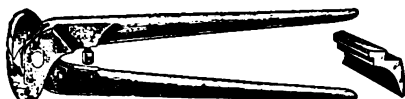


FIG. 481

KRAEUTER "GIANT" END-CUTTING

NO. 1851

Krauter bright finish with velvety black "Don't Slip" knurled handles. Extremely powerful, easy cutting.

Size, inches.....	5	6	7	8
Price each.....	\$1.45	\$1.70	\$2.00	\$2.25



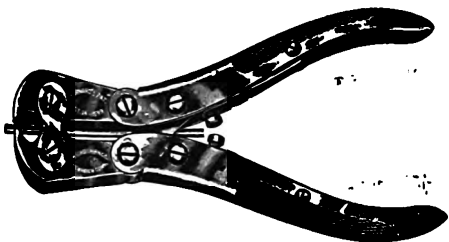
NO. 1851—FIG. 482

BERNARD END-CUTTING

NO. 125

Open throat. Full nickel plated. Spring in handle. Not for music wire.

Size, inches.....	4	5	6	7	8
Cuts wire, inch.....	⅜	½	⅝	¾	⅞
Price each.....	\$1.25	\$1.50	\$1.75	\$2.25	\$2.75



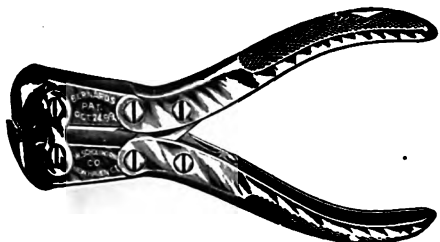
NO. 125—FIG. 478

BERNARD END-CUTTING

NO. 135

Will cut music wire up to No. 30. Open throat. Full nickel-plated, spring in handle.

Size 5-inch. Price each.....	\$2.00
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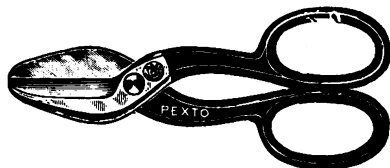


NO. 135—FIG. 479

HAND SHEARS OR SNIPS

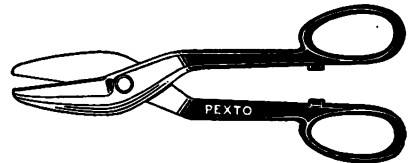
PEXTO SOLID FORGED STEEL

No. 82. Pocket snip. Blued handles and polished heads. Also made with Jappanned handles.
 No. 99. Black handles and polished heads.



NO. 82—FIG. 495

	Number	82	99
Length of cut inches		2	3
Length over all "		7	12½
Weight each, lbs.		½	1½
Price each		\$1.15	\$1.25



NO. 99—FIG. 496

SAMSON

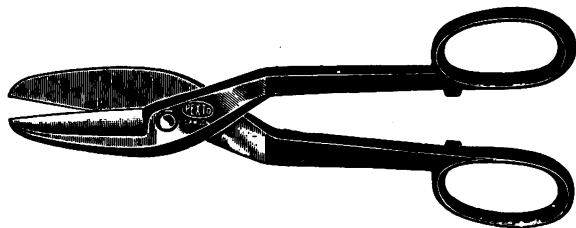


FIG. 498

These snips are forged from special, high grade material, and steel laid. They are fully warranted.

A popular priced snip of great strength, correct design and superior quality. Highly adapted for workers in sheet iron and sheet metals. Both price and quality commend them to the user for service.

LEFT HAND CUT, STRAIGHT PATTERN

Number	46	47	48	49	50	51	52	53
Will cut Iron, No.	24	25	26	27	28	28	28	28
Length of cut, inches.	4¼	4	3½	3⅞	2⅞	2¼	2	1¾
Length, over all, inches.	15¾	14½	14	12¾	11¾	10½	8½	8
Weight, lbs.	3⅞	3	2⅞	1⅞	1½	1⅞	⅝	½
Price, each	\$4.45	\$3.75	\$3.00	\$2.60	\$2.40	\$1.80	\$1.65	\$1.35

LEFT HAND CUT, CIRCULAR PATTERN

Number	C46	C47	C48	C49	C50	C51	C52	C53
Will cut Iron, No.	24	25	26	27	28	28	28	28
Length of cut, inches.	4½	4	3½	3	2½	2¼	2	1¾
Length over all, inches.	15¾	14½	14	12¾	11	10½	8½	8
Weight, lbs.	3⅞	3	2⅞	1⅞	1½	1⅞	⅝	½
Price, each	\$5.95	\$5.20	\$4.45	\$4.05	\$3.75	\$3.00	\$2.60	\$2.40

Finish, Blued Handles and Polished Heads. Also made with Jappanned Handles.

WISS REGULAR PATTERN

High grade crucible steel blades. Blued handles. Polished blades.

Nos.	6½	7	8	9	10	11	12
Length of cut, inch.	4½	4	3½	3	2½	2¼	2
Full length, inch.	15¾	14½	13¾	12½	11½	9½	8
Price each	\$5.00	\$4.00	\$3.25	\$2.75	\$2.50	\$2.00	\$1.50

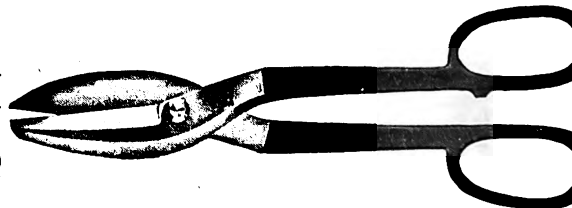


FIG. 3954

HAND SHEARS OR SNIPS

WISS COMBINATION PATTERN

COMBINATION CIRCULAR AND STRAIGHT

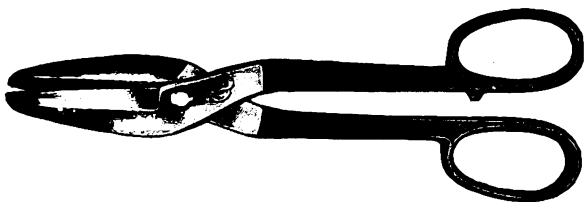


FIG. 3955

These snips are made with straight blades, but are ground and shaped in such a manner that they can be used as readily for cutting curves and irregular shapes as for straight work; thus combining all the advantages of both the circular and straight snip in one tool.

Nos.....	17	18	19	100
Length of cut, inches.....	4	3½	3	2½
Length over all, inches.....	14½	13½	12½	11½
Price, each.....	\$4.50	\$3.75	\$3.00	\$2.75

BARTLETT COMPOUND LEVER

SEARIGHT PATENT

Forged with solid blades of high grade crucible steel scientifically treated by measured heat; all pivots and parts made for the most trying work on metal. The design of the compounding lever action gives an evenly distributed cutting strain from a close-throat to the finish at the point of the blade.

Number.....	7	8	10	12	14
Length over all, inches.....	7	8	10½	12	14
Blade, inches.....	2	3	3½	4¼	5
Length of cut.....	1¼	1¾	2½	3	3½
Will cut iron, number.....	24	20-22	20	18	*
Price, each.....	\$3.35	\$5.00	\$7.80	\$9.75	\$11.20
Weight, each lbs.....	1½	2½	3½	5	7

*Capable of much heavier work than any common hand shear of equal length, and in many ways takes the place of the bench shear for heavy cutting.

No. 7 will cut paper and cloth as well as metal.

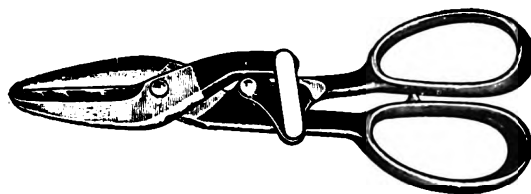
The No. 12 size is capable of cutting seams or multiples of thicknesses in metal work; is used for splitting large sheet and many classes of work that usually require bench shears.

PRICE LIST OF EXTRA PARTS

No.	7	8	10	12	14
Bolt only	\$0.05	\$0.06	\$0.08	\$0.10	\$0.12
Bolt and Nut	.09	.11	.15	.18	.20
Long Blade	.40	.75	1.00	1.25	1.50
Short Blade	.30	.50	.75	1.00	1.25
Short Handle	.25	.30	.50	.75	.85
Links (1 pair)	.07	.08	.10	.12	.15



NO. 10—FIG. 493



NO. 14—FIG. 494

PEXTO DOUBLE CUTTING SHEARS

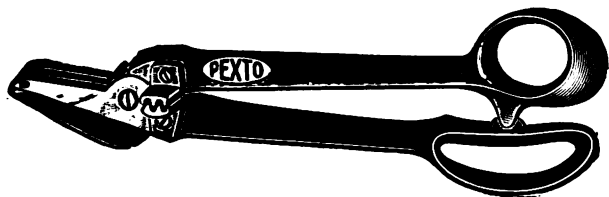


FIG. 497

The No. 02 is the same as the No. 2 except that it does not have the crimping attachment. The No. 22 is of pocket size and does not have crimping attachment.

Number.....	2	02	22
Weight.....lbs.	3	3	1
Length.....inches	12¾	12¾	8½
Price.....each	\$3.50	\$3.20	\$2.35

PEXTO BENCH SHEARS



FIG. 499

As regularly made, bench shears have a right hand cut with the lower blade on the right side of the shear. These shears are much larger than the ordinary tinners' hand shears.

Number	00	0	1	2	3	4	5	6	Elbow 31	Elbow 32	Elbow 33
Capacity Gauge Iron, No. 18.....	18	18	18	19	19	20	21	22	18	16	14
Length of Cut, inches.....	11½	10½	9	8¾	7¾	7¾	6¾	5¾	4	6	7¾
Length over all, inches.....	46	42½	39	37	31	30	27	25	26	39	46
Weight, lbs.....	36	30	24	19	13	12	9	8¼	9½	26	48
Price, each.....	\$29.15	\$26.40	\$18.65	\$16.65	\$15.35	\$13.85	\$12.65	\$10.65	\$12.15	\$23.10	\$33.3

Finish—Black Handles and Polished Heads.

SAUNDERS PIPE CUTTERS

The frames and T Handles are made of Malleable Iron. The spindle is of Machinery Steel and the wheels of drop-forged tool steel.



FIG. 505

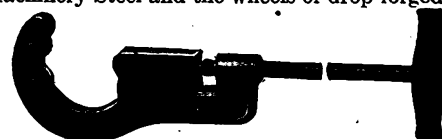
Numbers	1	2	3	4
Cuts pipe, inches.....	½ to 1	1 to 2	2 to 3	2½ to 4
Weight each, lbs.....	3¼	7	12½	16
Price, each.....	\$3.00	\$4.50	\$11.00	\$18.00
Extra cutter wheels, each.....	.24	.32	.60	.60
Extra pins.....	.10	.10	.15	.15

BARNES PIPE CUTTERS

The frames and T Handles are made of Malleable Iron. The spindle is of Machinery Steel and the wheels of drop-forged tool steel.



NOS. 1 AND 2. FIG. 506



NOS. 3, 4, 5 AND 6. FIG. 507

Numbers	1	2	3	4	5	6
Cuts pipe, inches.....	½ to 1	½ to 2	1½ to 3	2½ to 4	4 to 6	6 to 8
Weight each, lbs.....	3	5	9	14	23	28
Price, each.....	\$4.50	\$6.00	\$10.00	\$20.00	\$30.00	\$40.00
Extra cutter wheels, each.....	.25	.30	.40	.50	.75	.75
Extra pins, doz.....	1.00	1.00	1.00	2.00	2.00	2.00

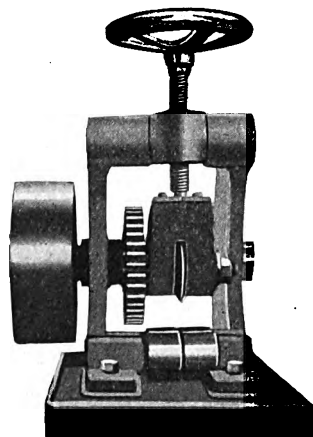


FIG. 508

LICK PIPE CUTTING MACHINE

Numbers	1	2
Capacity pipe, inches.....	¼ to 2 inc.	¼ to 4 inc.
Diameter of pulley, inches.....	10	14
Face of pulley, inches.....	3½	3½
Weight.....	185 lbs.	185 lbs.
Price, each.....		

Cutter mounted on swinging arm, one extra cutter provided.

BOLT CLIPPERS

"NEW EASY"



FIG. 500

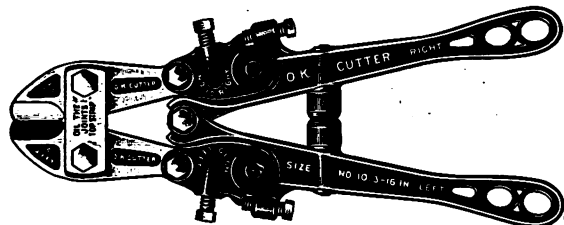


FIG. 501



FIG. 502

"New Easy" Bolt Clippers are made of good stock, in a careful manner, with special machinery and tools. All parts are made in duplicate to standard gauges and will fit. The simple turn of a screw provides ample adjustment from one thousandth of an inch up, keeping the cutting edges a long time in contact. The handles are of japanned malleable iron, tough and strong; the jaws are tool steel. The jaws can be dressed when necessary with a mill file.

O. K.

The O. K. Cutters may be had with two styles of jaws, clipper cut as shown (with large bevel on top side), for trimming bolts and rivets and other work requiring a nearly flat end; or, secondly, center cut, in which the bevels are equal and the cutting edge is in the center of the thickness of the jaw. Center cut are better for use where close cutting is not necessary. The cutting edge has also a little harder temper than the clipper cut jaws.

ALLEN-RANDALL

Allen-Randall Bolt and Rivet Clippers are strong tools, having a set screw adjustment capable of taking up the wear of the knives. The straps for the jaws are made without the locking devices used in the "Easy" and "New Easy" styles, the right jaw bolt having a left-hand thread and the left jaw bolt a right-hand thread. They are made in five sizes, No. 4 being made to cut $\frac{3}{4}$ -inch bolts in the thread.

NEW EASY

O. K.

ALLEN-RANDALL

Number.....	0	1	2	3	10	14	0	1	2	3	4
For: Bolts, inches.	$\frac{1}{8}$	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{5}{8}$	$\frac{1}{8}$	$\frac{1}{4}$	$\frac{1}{8}$	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{5}{8}$	$\frac{3}{4}$
Length, inches...	18	24 $\frac{1}{2}$	30	36	10	14	18 $\frac{1}{2}$	24	30 $\frac{3}{4}$	36	42
Weight, pounds...	3	5 $\frac{3}{4}$	9	13	1 $\frac{1}{2}$	2 $\frac{1}{8}$	3 $\frac{1}{8}$	5 $\frac{1}{8}$	9 $\frac{1}{8}$	13	18 $\frac{1}{2}$
Price, each.....	\$3.75	\$5.00	\$7.00	\$9.00	\$2.75	\$3.25	\$3.75	\$5.00	\$7.00	\$9.00	\$12.00

PARTS FOR BOLT CLIPPERS

NEW EASY BOLT CLIPPER

CUTTER HEADS AND PARTS

	No. 0 Price	No. 1 Price	No. 2 Price	No. 3 Price
Cutter Head, complete (see cuts of parts).	\$2.10	\$2.70	\$3.70	\$4.65
Pair Cutting Jaws, ready for use.	1.35	1.65	2.35	3.00
One Cutting Jaw, ready for use. ....	.68	.83	1.18	1.50
Bottom Strap, with two steel bolts. ....	.40	.50	.60	.70
Top Strap.....	.10	.20	.30	.40
Lock Nuts, pair.....	.10	.15	.20	.25
Lock Plate.....	.10	.15	.20	.25
Lock Plate Bolt.....	.05	.05	.05	.05

HANDLES AND PARTS

	\$1.90	\$2.30	\$3.30	\$4.35
Pair of Handles, complete (see cuts of parts)				
One Handle, complete. ....	.95	1.15	1.65	2.20
One Handle, without parts, long piece only	.40	.50	.90	1.35
Adjusting Sections, with one rivet, each..	.25	.30	.35	.40
Steel Adjusting Screws, pair. ....	.10	.12	.14	.16
Steel Bolts, to connect jaws and handles,				
pair.....	.10	.12	.14	.16
Eye Bolts, with nuts and rivets, pair. ....	.20	.25	.30	.35
Rubber Buffers, with rivets and washers,				
pair.....	.20	.25	.30	.35

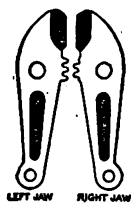


FIG. 503

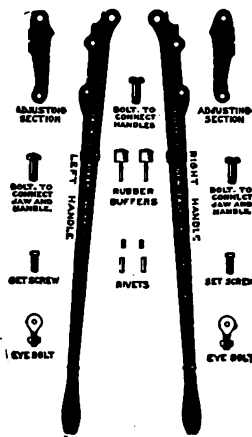


FIG. 504

The bolts holding the jaws in the handles are part of the handles, and are sent with complete handles. They are sent with jaws and adjusting sections only when ordered.

When ordering repairs for the No. 3 let us know whether or not there is a star on the under side of each jaw after the words "New Easy" and lettering on the adjusting section. It is necessary that we should know this in order to secure the correct parts.

AUTO-BRAKE BAND LINING CUTTER

CAPACITY $\frac{3}{8}$ INCH AND LIGHTER BRAKE BAND LINING

A useful, small, compact machine of great strength and constructed to cut with ease. With the use of this little machine brake band lining up to $\frac{3}{8}$ x3 inches can be cut with one stroke of lever. Its eccentric cutting device requires very little effort for cutting up to its full rated capacity and will prove a very desirable machine on the counters of Auto Supply Houses, Hardware Stores selling automobile accessories and on the bench in the Garage and Shop.

Weight, lbs.....	17
Length of blades, inches.....	3 $\frac{1}{2}$
" " bed.....	10 $\frac{1}{2}$
Height of bed, inches.....	6 $\frac{1}{2}$
Length over all including lever, inches.....	18
Price.....	

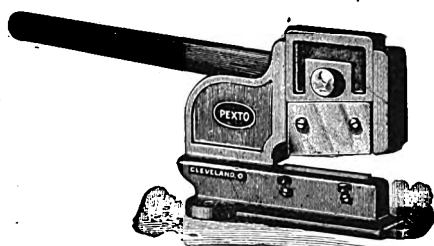


FIG. 509

ST. ANTHONY SHEARS

U. S.

One man on the lever will cut just as heavy iron as two men will do on any other shear. This shear is 42 inches long, 20 inches high, 7-inch knives. Weight 500 lbs. Will cut 4x $\frac{3}{4}$ -inch flat iron, 1 $\frac{1}{8}$ -inch round, no handle furnished.

Price.....



FIG. 535

CHAMPION

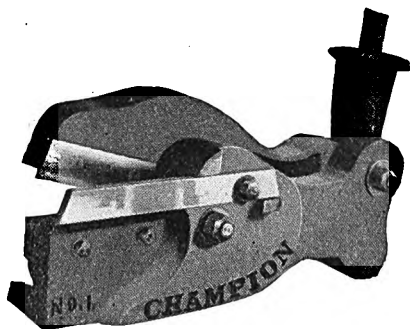


FIG. 536

7-inch knife, weight 155 lbs. Will cut 6 $\frac{1}{2}$ x $\frac{1}{4}$ plow steel 3x $\frac{3}{8}$ flat or $\frac{3}{4}$ -inch round iron. No lever furnished with machine.

Price.....

ST. ANTHONY

NO. 1

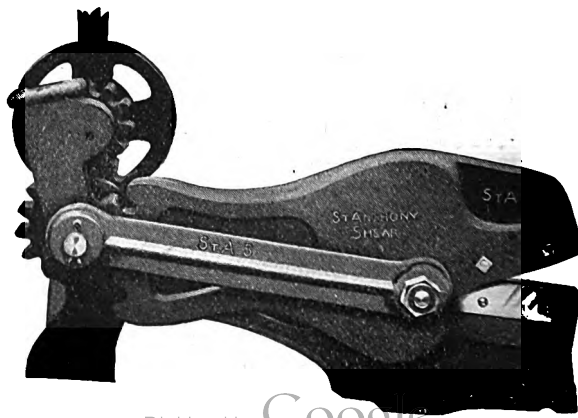
The St. Anthony Shear is a triple leverage or back geared machine. By using the back gear it will cut 1 inch round or 3x $\frac{3}{4}$ inch flat iron. By using the back gear and applying 100 lbs. on the handle there is exerted a force of 30 tons on the blades. It is a machine of large capacity and is strong, handy and a most perfect working medium priced machine for hand power. No handle is furnished with this shear.

7-inch blade, weight 350 lbs. Price.....

NO. 2

The No. 2 St. Anthony Shear is a triple leverage or back geared machine heavier than the Champion machine and a little lighter than the St. Anthony Shear No. 1. It has a capacity of $\frac{1}{2}$ inch round or 4x $\frac{1}{2}$ inch flat iron, or equivalent. No handle is furnished with this shear. Weight 265 lbs.

Price.....



Digitized by Google FIG. 537

BELOIT LEVER SPLITTING SHEARS

FOR CUTTING HEAVY PLATES

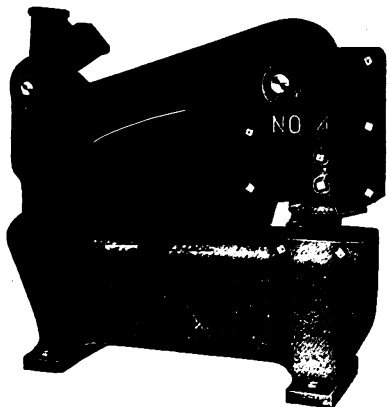


FIG. 531
BUILT IN FOUR SIZES

These machines are intended for cutting heavy plates of any length or width. The lever works from the back, bringing the operator out of the way when cutting large sheets. They are the most powerful and easiest to operate of any machines made for cutting sheets by hand.

The bodies are offset so that when splitting large sheets the metal will pass through freely.

The knives are adjustable and reversible, giving four cutting edges. May be easily and quickly removed for sharpening.

■ A hand lever is furnished with each machine. When required, we can furnish iron legs, but only do so when ordered special, for which an additional charge is made.

No.	Will cut plate inches	Length of Knives, in.	Weight lbs.	Price
2	$\frac{1}{4}$	6	280	.....
2½	$\frac{5}{16}$	6	350	.....
3	$\frac{3}{8}$	6½	625	.....
4	$\frac{1}{2}$	7	900	.....

THE BELOIT SPLITTING SHEAR

These Splitting Shears have a powerful leverage to easily perform the work for which they are designed. They are durable, and especially adapted to cutting sheets of any length, as well as bars. Being offset, the metal will not bind when splitting long or wide sheets, but will pass through freely.

The knives on these machines are adjustable, and may be easily and quickly removed for sharpening. For light work in machine shops, garages, tin shops, etc., this little shear will be found to be one of the handiest of its type in the market.

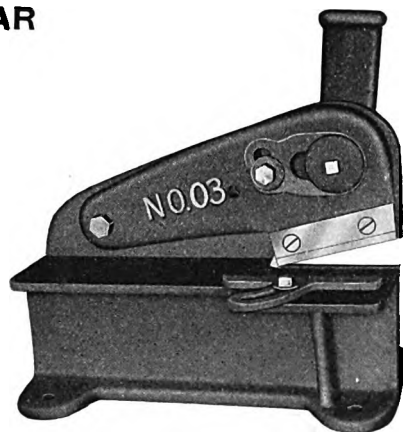


FIG. 532
BUILT IN TWO SIZES—NOS. 03 AND 04

No. 03— $\frac{1}{8}$ " sheet metal, $\frac{1}{2}$ " rounds, blades 5 x 1½", weight 125 lbs.

No. 04— $\frac{1}{4}$ " sheet metal, $\frac{5}{8}$ " rounds, blades 5½ x 2", weight 300 lbs.

Price

THE BELOIT COMBINED PUNCH AND SPLITTING SHEARS



FIG. 533

This is one of the handiest machines of its kind on the market. Sheets of any length and width can be cut. The lever works toward the operator in both cutting and punching.

Knives on all sizes are 9 inches long and being adjustable and reversible gives them four cutting edges. Can be easily and quickly removed for sharpening when necessary.

No.	Will Shear Iron inches.	Will Punch Hole, inches		Weight lbs.	Price
		in $\frac{1}{4}$ " Iron	in $\frac{3}{8}$ " Iron		
3A	$\frac{1}{8}$	$\frac{1}{4}$	....	250	.....
3B	$\frac{1}{4}$	$\frac{1}{8}$	....	340	.....
3C	$\frac{5}{16}$	..	$\frac{3}{8}$	625	.....
3D	$\frac{3}{8}$	..	$\frac{3}{8}$	700	.....

WHITNEY PORTABLE HAND METAL PUNCHES

MOST POWERFUL, EASIEST OPERATED, QUICKEST CHANGED

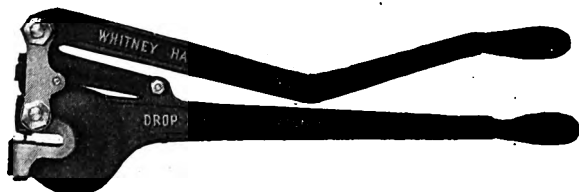


FIG. 511

NO. 2

This size punch does the combined range of work of several sizes of some makes of portable hand metal punches. The lightest, most powerful portable hand punch in use. Can be carried as a hand tool, and used upon elevations, such as steel structural work, roofs, etc., and operated without a vise. Note its compact, symmetrical proportions in cut. Punches up to $\frac{1}{2}$ -inch hole in lighter metals. Punches in sizes from $\frac{1}{8}$ to $\frac{1}{2}$ -inch, by $\frac{1}{16}$ -inch, 13 sizes. Weight of special vise for bench work five pounds.

NO. 1

Drop forged parts throughout. Construction same as No. 2 Punch, heavier built, with detachable threaded pipe handles. Very strongly constructed and reinforced, for heavier metal workers, structural steel and iron builders, boiler, tank and stack makers.

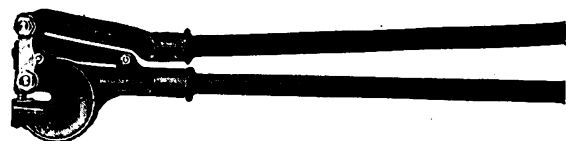


FIG. 510—DETACHABLE PIPE HANDLES



FIG. 512

PORTABLE CHANNEL IRON

Punches to center of 4-inch Channel Iron, with $1\frac{1}{2}$ -inch flanges. Same construction as the popular No. 2 Punch; in fact, every part of this Channel Iron Punch is interchangeable with the No. 2 Punch. The same punches and dies, and all other small parts can be used in both. The only part that is different is the Drop-Forged Lower Jaw, which has the opening, back of die socket, that allows Channel and Angle Iron to be pushed through from the side, and punched in web, between the flanges. A trifle heavier than No. 2 Punch. Both Punches have the same 13 sizes of punches and dies, $\frac{1}{8}$ to $\frac{1}{2}$ -inch by $\frac{1}{16}$ -inch.

PRICES AND CAPACITIES

Number	1	2	Channel Iron
Capacity.....	$\frac{3}{8}$ inch Hole	$\frac{1}{4}$ inch Hole	$\frac{1}{4}$ inch Hole
Length, inches.....	$\frac{1}{4}$ inch Iron	$\frac{1}{4}$ inch Iron	$\frac{1}{4}$ inch Iron
Weight, pounds.....	34	23	23
Price, each.....	21	14	16 $\frac{1}{2}$
Extra Punches.....	\$25.00	\$21.65	\$23.35
Extra Dies.....	.80	.80	.80
	.80	.80	.80

FLAT AND SPIRAL PUNCHES

RIVET SIZES

Flat: No. 507
Spiral: No. 509



FIG. 259



FIG. 260

FRACTIONAL SIZES

Special lengths and diameters made to order.

DIMENSIONS AND PRICES

No. of Punch	*Size of Punches Inches	Size of Head on Punch Inches	Length of Punch Inches		Price Each	
			Flat	Spiral	Flat	Spiral
2	1/8 - 3/8	1 1/2	1 1/2	1 1/2	\$0.35	\$ 0.38
3	1/8 - 1/2	1 1/2	1 1/2	1 1/2	.40	.50
4	1/8 - 3/4	1 1/2	1 1/2	1 1/2	.60	.70
5	3/8 - 1	1 1/2	1 1/2	2 1/2	.90	1.05
6	1/2 - 1 1/8	1 1/2	2 1/2	2 1/2	1.20	1.40
7	3/4 - 1 1/2	1 1/2	2 1/2	2 1/2	1.60	1.95
8	1 - 1 3/4	2 1/2	3	3 1/2	2.50	3.00
9	1 1/2 - 2 1/4	2 1/2	...	3 1/2	...	4.00
10	2 - 2 3/8	2 1/2	...	3 1/2	...	9.00
11	2 1/2 - 3 1/4	3 1/2	...	3 1/4	...	15.00
12	3 1/4 - 4 1/8	4 1/4	...	3 3/8	...	22.00

NOTE—Number 2 and Number 3 punches will be furnished at regular prices in 32d sizes within the limits listed.

*Numbers 4, 5, 6, 7 and 8 punches will be furnished at regular prices in 16th sizes within the limits listed.

Less than six of a size will be charged as single punches.
Special lengths and diameters made to order.

SIZES AND PRICES

No. of Punch	For Size Rivet Inches	Diam. of Punch Inches	Size of Head on Punch Inches	Flat Punches		Spiral Punches	
				Length Over all Inches	Price per Doz.	Length Over all Inches	Price per Doz.
2	1/8	.21	1 1/2	1 1/2	\$4.00	1 1/2	\$4.50
2	1/4	.28	1 1/2	1 1/2	4.00	1 1/2	4.50
2	3/8	.34	1 1/2	1 1/2	4.00	1 1/2	4.50
2	1/2	.41	1 1/2	1 1/2	4.00	1 1/2	4.50
3	3/8	.21	1 1/2	1 1/2	4.50	1 1/2	5.50
3	1/4	.28	1 1/2	1 1/2	4.50	1 1/2	5.50
3	3/8	.34	1 1/2	1 1/2	4.50	1 1/2	5.50
3	1/2	.41	1 1/2	1 1/2	4.50	1 1/2	5.50
3	3/8	.47	1 1/2	1 1/2	4.50	1 1/2	5.50
3	1/2	.55	1 1/2	1 1/2	4.50	1 1/2	5.50
4	1/4	.34	1 1/2	1 1/2	7.00	1 1/2	8.00
4	3/8	.41	1 1/2	1 1/2	7.00	1 1/2	8.00
4	1/2	.47	1 1/2	1 1/2	7.00	1 1/2	8.00
4	3/8	.55	1 1/2	1 1/2	7.00	1 1/2	8.00
4	1/2	.62	1 1/2	1 1/2	7.00	1 1/2	8.00
4	3/8	.69	1 1/2	1 1/2	7.00	1 1/2	8.00
4	1/2	.74	1 1/2	1 1/2	7.00	1 1/2	8.00
4	3/4	.80	1 1/2	1 1/2	7.00	1 1/2	8.00
5	3/8	.41	1 1/2	1 1/2	10.00	2 1/8	12.00
5	1/2	.55	1 1/2	1 1/2	10.00	2 1/8	12.00
5	3/8	.62	1 1/2	1 1/2	10.00	2 1/8	12.00
5	1/2	.69	1 1/2	1 1/2	10.00	2 1/8	12.00
5	3/8	.74	1 1/2	1 1/2	10.00	2 1/8	12.00
5	1/2	.80	1 1/2	1 1/2	10.00	2 1/8	12.00
5	3/4	.86	1 1/2	1 1/2	10.00	2 1/8	12.00
5	1	.94	1 1/2	1 1/2	10.00	2 1/8	12.00
5	1 1/8	1.00	1 1/2	1 1/2	10.00	2 1/8	12.00
5	1 1/4	1.06	1 1/2	1 1/2	10.00	2 1/8	12.00
6	5/8	.69	1 1/2	2 3/8	14.00	2 1/8	16.50
6	3/4	.74	1 1/2	2 3/8	14.00	2 1/8	16.50
6	7/8	.80	1 1/2	2 3/8	14.00	2 1/8	16.50
6	1	.86	1 1/2	2 3/8	14.00	2 1/8	16.50
6	1 1/8	.94	1 1/2	2 3/8	14.00	2 1/8	16.50
6	1 1/4	1.00	1 1/2	2 3/8	14.00	2 1/8	16.50
6	1 1/2	1.06	1 1/2	2 3/8	14.00	2 1/8	16.50
7	1 1/8	1.00	1 1/2	2 1/2	19.00	2 1/8	23.00
7	1 1/4	1.06	1 1/2	2 1/2	19.00	2 1/8	23.00

STANDARD REDUCING COUPLINGS

SIZES AND PRICES

Nos. of Couplings	Diameter of Thread Inches	No. U.S. Thread per Inch	Price Each of Short Coupling	Price Each Long with Steel Block	
				of Steel Block	of Steel Block
3-2	7/8	12	\$1.25	\$1.50	\$0.25
4-3	1 1/8	12	1.50	1.75	.25
4-2	1 1/8	12	1.50	1.75	.25
5-4	1 3/8	12	1.75	2.50	.50
5-3	1 3/8	12	1.75	2.50	.50
5-2	1 3/8	12	1.75	2.50	.50
6-5	1 7/8	12	2.00	2.75	.50
6-4	1 7/8	12	2.00	3.00	.75
6-3	1 7/8	12	2.00	3.00	.75
7-6	1 7/8	12	2.50	3.00	.50
7-5	1 7/8	12	2.50	3.50	.75
7-4	1 7/8	12	2.50	3.75	1.00
7-3	1 7/8	12	2.50	3.75	1.00



FIG. 261

HYDRAULIC PUNCHES

HEAD PUNCH

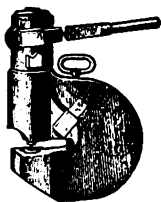


FIG. 513

The head punch (so-called, as it has a head like the jack), is a great improvement upon the hydraulic screw punch. It will do double the work in the same time, will keep in repair many times as long, and is much more easily packed. It is fitted with a pinion meshing into a rack cut on the ram, to withdraw punch from metal after punching. This has since become generally adopted.

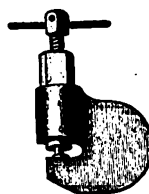


FIG. 514

SCREW PUNCH

This punch is so well known to the trade that a description is unnecessary; it is and has been in very general use with most boiler makers, bridge builders, etc., for years. All punches are made from solid steel forgings.

REGULAR SIZES HYDRAULIC HEAD AND SCREW PUNCHES

No.	Thick- ness Inch	Rivet Inch	*Gap Inches	Weight Pounds	Price Hydraulic	*Gap Inches	Weight Pounds	Price Screw
10	1/4	5/8	2	50	\$ 70.00	3 1/2	55	\$ 80.00
11	3/8	5/8	2	65	80.00	3 1/2	70	90.00
12	1/2	5/8	2	70	100.00	3 1/2	105	110.00
13	1/2	3/4	2	85	120.00	3 1/2	110	130.00
14	5/8	3/4	2	110	150.00	3 1/2	140	170.00
15	3/4	7/8	2	150	200.00	3 1/2	180	220.00
17	1	1	2	280	250.00	4	350	275.00

*Gap refers to distance from edge of sheet to center of hole. Greater depth of gap to order.

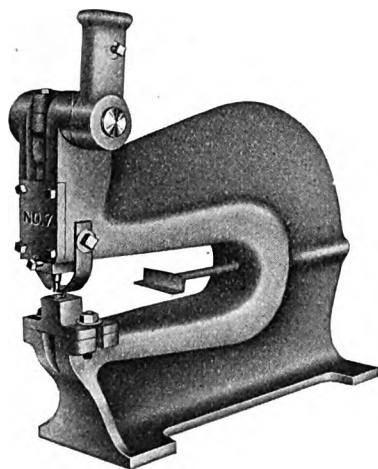


FIG. 516

BELOIT HAND BENCH PUNCH

Capacity of 1/4-Inch Hole in 1/4-Inch Plate

These machines are built strong and compact and easy to operate. Designed with as few parts as possible. They are intended for light work only. Built in five sizes. The lever socket will work both ways, either front or back, enabling the operator to work the lever from the rear of the machine when punching large sheets.

The mandrels are made square so that irregular shaped punches and dies may be used without turning and injuring either die or punch.

Each machine is furnished with one punch and die, one hand lever and an adjustable gauge to regulate the distance of holes from the edge of the sheet.

No.	Punches to center of, inches	Weight, lbs.	Price
5	12	150	.....
6	20	200	.....
7	30	300	.....
8	36	400	.....
9	48	900	.....

MARVEL PUNCH

NO. 10

Has a row of four punches in front, sizes 1/8, 1/4, 1/2 and 3/4 inch, one punch being used at a time. All the punches may be left in place at all times if desired. Punches are simply dropped in place, and the steel block with thumb screw can be rapidly shifted over any punch desired, and punch tightened by turning thumb screw. The slide case is hardened steel. The movable block is hardened tool steel. The die is made of one piece, 1/8 in. wide, top face of die is 1 1/2 inches from bottom of throat and 1 3/4 inches from top of throat, and is also extended forward so as to be able to punch web and flange of channels, eye beams, angles, etc.

Will punch angle iron 1/2 inch from center of hole to inside corner of angle.

Lever is used swinging either way.

Capacity, 1/8 hole in 1/4-inch stock.

Throat 4 inches. Weight 90 lbs.

Price complete with 4 Punches, Die and Lever.....

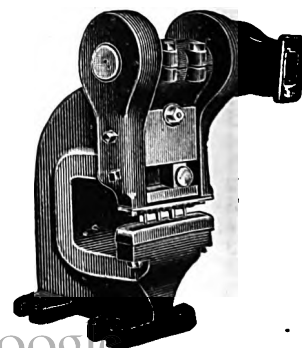


FIG. 517

STANDARD PUNCH COUPLINGS

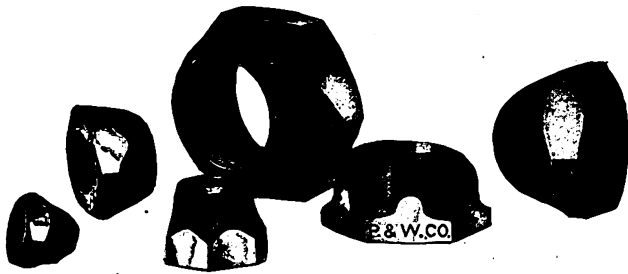


FIG. 263

SIZES AND PRICES

Number of Coupling	Price Each	Largest Outside Diameter of Couplings Ins.	Diameter Thread Inches	Number of Threads per Inch U. S. F.
2	\$1.00	1 $\frac{1}{8}$	1 $\frac{1}{8}$	12
3	1.25	1 $\frac{1}{4}$	1 $\frac{1}{8}$	12
4	1.50	1 $\frac{3}{8}$	1 $\frac{1}{8}$	12
5	1.75	2 $\frac{1}{4}$	1 $\frac{1}{8}$	12
6	2.00	2 $\frac{5}{8}$	1 $\frac{1}{8}$	12
7	2.50	2 $\frac{7}{8}$	1 $\frac{1}{8}$	12

PUNCH DIES

Dies carried in stock in sizes listed for either rivet or fractional size of punch, and order should state for which style of punch the die is wanted.

Other sizes made to order at special prices which will be furnished on application.

DIMENSIONS AND PRICES

Number of Die	Price Each	Diam. in Ins. of Punches that Die will take	Outside Diam. of Die Inches	Thickness of Die Inches
2	\$0.75	$\frac{1}{8}$ - $\frac{5}{16}$	$\frac{3}{4}$	$\frac{5}{8}$
3	1.00	$\frac{1}{8}$ - $\frac{1}{4}$	1	$\frac{3}{4}$
4	1.50	$\frac{1}{4}$ - $\frac{3}{8}$	1 $\frac{1}{2}$	1
5	2.00	$\frac{1}{4}$ - 1	2	1
6	2.50	$\frac{1}{2}$ - 1 $\frac{1}{4}$	2 $\frac{3}{8}$	1 $\frac{1}{4}$
7	4.50	$\frac{3}{4}$ - 1 $\frac{5}{8}$	2 $\frac{7}{8}$	1 $\frac{1}{4}$



FIG. 264

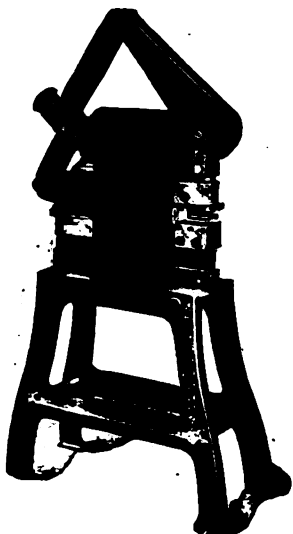
BUFFALO COMBINATION "ARMOR PLATE" PUNCHES AND SHEARS

An exceedingly popular and extensively used machine, made in three sizes. The frame is of armor plate steel, having a tensile strength of 75,000 pounds—over seven times stronger than cast iron. The use of this highly desirable material in the frame makes possible a machine of large capacity and light weight, occupying but a small space.

A most dependable tool, which will make clean, accurate cuts to its full capacity. The strippers are adjusted to prevent binding of the stock when the cutter leaves the metal. A twin-socket lever, operating both punch and shears, is worked from one side; its powerful leverage makes operation easy on all work.

Number	Punch Inches	Cut Rounds Inches	Cut Flats Inches	Punches Furnished Inches	Depth Throat Inches	Weight Lbs.
2-B	$\frac{1}{4} \times \frac{1}{4}$	$\frac{5}{8}$	2 $\times \frac{5}{8}$	$\frac{1}{8}$, $\frac{1}{4}$ and $\frac{1}{2}$	3 $\frac{3}{4}$	125
3-B	$\frac{3}{8} \times \frac{3}{8}$	$\frac{3}{4}$	3 $\times \frac{1}{2}$	$\frac{1}{4}$, $\frac{3}{8}$ and $\frac{1}{2}$	4	215
4-B	$\frac{1}{2} \times \frac{1}{2}$	1	3 $\times \frac{5}{8}$	$\frac{1}{4}$, $\frac{3}{8}$ and $\frac{1}{2}$	5 $\frac{1}{4}$	400

Prices upon application.



NO. 2B, 3B, AND 4B—FIG. 519

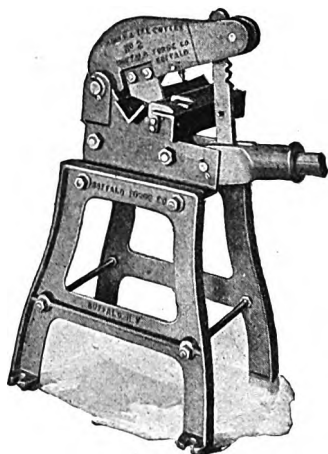
BUFFALO "ARMOR PLATE" TEE AND ANGLE SHEARS

With or without Punches—also cuts Channels.

The big feature about this machine is the open throat. This permits of entering the material from the front of the machine, instead of inserting through the sides, as is usually the case with most machines. This feature reduces wear and tear on the knives, consequently prolonging their life, and it also makes it possible to do the work in much less space than with machines where the material is run in from the side, over the knives.

By the use of the pawl and ratchet a much greater leverage is obtained, thereby making it possible to punch and shear heavier stock with less effort, than with the old style machines.

Each machine is tested in excess of capacity without breaking, showing maximum strength.



NO. 2 ANGLE CUTTER—FIG. 520

No.	Cuts Angles Inches	Cuts Tees Inches	Cuts Flats Inches	Punches Holes Inches	Shipping Weight Lbs.
1	$1\frac{3}{4} \times 1\frac{3}{4} \times \frac{3}{8}$	$1\frac{1}{4} \times 1\frac{1}{4} \times \frac{3}{8}$	$1\frac{1}{4} \times \frac{3}{8}$	$\frac{1}{2} \times \frac{3}{8}$	118
2	$2\frac{1}{2} \times 2\frac{1}{2} \times \frac{1}{4}$	$1\frac{3}{4} \times 1\frac{3}{4} \times \frac{3}{8}$	$1\frac{3}{4} \times 1\frac{1}{2}$	$\frac{1}{2} \times \frac{3}{8}$	216
3	$3 \times 3 \times \frac{3}{8}$	$2\frac{1}{4} \times 2\frac{1}{4} \times \frac{1}{4}$	$2\frac{1}{2} \times \frac{3}{8}$	$\frac{5}{8} \times \frac{3}{8}$	448

Same knives can be used for Angles, Flats and Channels, Tees only requiring special knives. Any size Punch and Die furnished as listed.

Price upon application.

BUFFALO "ARMOR PLATE" BLACKSMITH PUNCH, SHEAR AND BAR CUTTER

The design of this machine has no equal in strength, compactness and efficiency. It is high-class in every respect and, with all its operations, is simplicity itself. Every part is guaranteed to work right and stand up under continued rough service. The double frame of "Armor Plate" Steel gives rugged strength combined with the lightest weight. The powerful twin-socket lever operates all the cutting parts. Five holes of different sizes can be punched, round and square rods cut, and bars sheared with absolutely no change of attachments. Very useful in blacksmith and jobbing shops. We supply a set of 5 punches and dies of any capacity as required by the purchasers, up to maximum, as per table below.

No.	Max. Cap. of Punch Inches	Cuts Flats Inches	Cuts Rounds Inches	Cuts Squares Inches	Weight lbs.
6	$\frac{1}{2} \times \frac{3}{8}$	$\frac{1}{2} \times 4$	up to $\frac{3}{4}$	up to $\frac{5}{8}$	480
7	$\frac{1}{2} \times \frac{3}{8}$	$\frac{1}{2} \times 4$	up to $\frac{3}{4}$	up to $\frac{5}{8}$	375

No. 7 has no legs, being designed for bolting to bench.

Prices upon application.



NO. 6—FIG. 521

PRACTICALLY FOUR MACHINES IN ONE

LITTLE GIANT HAND PUNCH

STYLE S

Designed and built to conform to the specifications of the United States Navy Yards. Highly recommended to sheet metal workers, garage owners, machine shops and others having use for a machine of this kind.

Punches $\frac{1}{8}$ inch holes in $\frac{1}{8}$ inch soft steel or iron.

Depth of throat 6 inches, width 2 inch gap.

Weight, 160 pounds.

Overall dimensions of punch without lever 19 inches long, 10 inches wide, 19 inches high.

Removable lever about 5 feet long.

Price with $\frac{1}{8}$, $\frac{1}{4}$ and $\frac{3}{8}$ inch punches and dies

Price extra punches and dies up to $\frac{3}{8}$ inch each

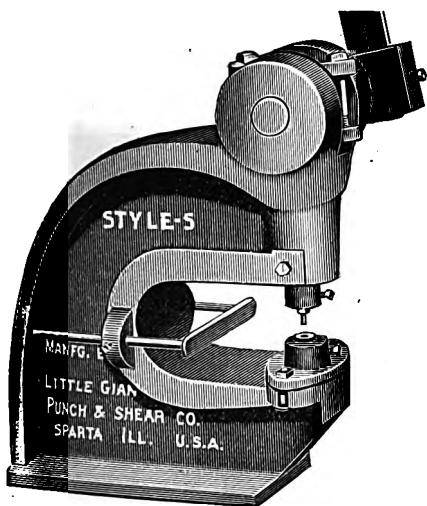


FIG. 3956

LITTLE GIANT COMBINED HAND PUNCH AND SHEAR

Built in three sizes. Simple, strong, durable, cheap. For blacksmiths, wagon makers, carriage makers, machine shops, implement manufacturers and all metal workers.

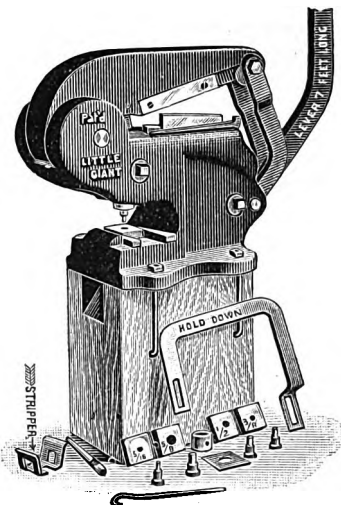


FIG. 515

CAPACITIES AND PRICES

Size No.	Will Cut Iron, inches			Will Punch	Will Punch from edge, inches	Size of Punches & Dies, inches	Weight pounds	Price Complete
	Flat	Band	Round					
1	$\frac{5}{8} \times 2\frac{1}{2}$	$\frac{1}{4} \times 8$	1	$\frac{5}{8}$ " hole in $\frac{1}{2}$ "	$3\frac{1}{2}$	$\frac{5}{8}, \frac{1}{2}, \frac{1}{4}, \frac{3}{8}, \frac{1}{8}$	525	.....
2	$\frac{1}{2} \times 4$	$\frac{1}{4} \times 7$	$\frac{7}{8}$	$\frac{1}{2}$ " hole in $\frac{1}{2}$ "	$2\frac{3}{4}$	$\frac{5}{8}, \frac{1}{2}, \frac{1}{4}, \frac{3}{8}, \frac{1}{8}$	350	.....
3	$\frac{3}{8} \times 4$	$\frac{1}{4} \times 6$	$\frac{3}{4}$	$\frac{3}{8}$ " hole in $\frac{3}{8}$ "	$2\frac{1}{2}$	$\frac{1}{2}, \frac{1}{4}, \frac{3}{8}, \frac{1}{8}, \frac{1}{16}$	280	.....

Extra Punches and Dies (regular sizes) and special Punches and Dies can be furnished upon order at additional cost.

Floor space occupied, inches: No. 1, 12 x 26, No. 2, 10 x 24, No. 3, 8 x 22.

MARVEL ROD CUTTERS

Cutting dies have round openings of correct size to cut off rods and wire within the capacity of the machine, which insures good work with ends round and true. This cutter is so arranged as to bring the lever at a convenient height from the bench, and the gearing is so placed as to remove all danger of crushing the operator's hand. The round steel lever can be instantly removed when desired.

The center of leverage is down low, which lessens the pull on the bench. The neat gauge is very handy when cutting a number of pieces of the same length.

Price, No. 5; Cuts Rods $\frac{3}{8}, \frac{1}{2}, \frac{3}{4}, \frac{1}{2}, \frac{1}{4}$ -inch and Intermediate Sizes; Weight, 12 pounds. Complete, with Lever, Gauge and Gauge Rod, each... ..

" No. 6; Cuts Rods $\frac{5}{8}, \frac{1}{2}, \frac{1}{4}, \frac{3}{8}$ -inch and Intermediate Sizes; Weight 35 pounds. Complete, with Lever, Gauge and Gauge Rod, each.....

" No. 7; Cuts Rods $\frac{1}{8}, \frac{3}{4}, \frac{5}{8}, \frac{1}{2}, \frac{3}{8}$ -inch and Intermediate Sizes; Weight, 95 pounds. Complete, with Lever, Gauge and Gauge Rod, each.....

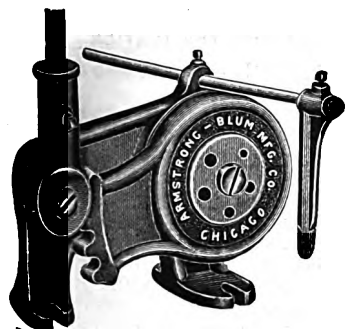


FIG. 518

CONCRETE-REINFORCING BAR CUTTER

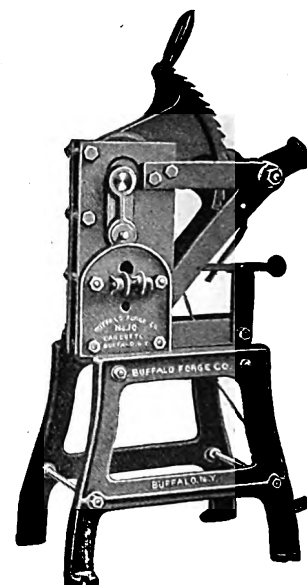
CUTS 1-INCH TWISTED, SQUARE, OR JOHNSON BARS
CUTS 1½-INCH ROUND BARS.

This machine weighs only 310 lbs., yet is stronger and of equal capacity to a cast iron machine of twice the weight. It is therefore highly desirable on scaffolding and is easily moved about. The frame consists of two heavy plates of "Armor Plate" steel, of 75,000 lbs. tensile strength, which are rigidly bolted and riveted together, enclosing the working parts. The stripper on side prevents binding of the metal, and the roller prevents the bars from dulling the knives.

A treadle is provided for dropping the segment back into place after each cutting operation.

Can be mounted on wheels, or furnished without legs for bench use. Two sets of knives are furnished, for cutting light, medium and heavy bars.

No.	Type	Cuts Twisted Squares	Cuts Round Bars	Shipping Weight	List Price
10	Legs	up to 1"	up to 1½"	315 lbs.	.....
10-A	Wheels attached to legs	up to 1"	up to 1½"	340 lbs.	.....
10-B	Without legs	up to 1"	up to 1½"	254 lbs.	.....
11	Legs	up to 1¼"	up to 1¾"	500 lbs.	.....
11-A	Wheels attached to legs	up to 1¼"	up to 1¾"	525 lbs.	.....
11-B	Without legs	up to 1¼"	up to 1¾"	439 lbs.	.....



NO. 10—FIG. 526

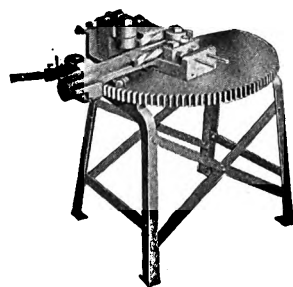


FIG. 529

BAR BENDERS

FOR BENDING REINFORCEMENT BARS, OR FOR HEAVY MANUFACTURING
MADE IN TWO MODELS—RIGHT-HAND AND LEFT HAND

NO. 6 "U" BENDER, RIGHT-HAND TYPE

NO. 7 "U" BENDER, LEFT-HAND TYPE

For Cold Bending: Flat ¾ x 2 in., Round 1½ in., Square 1¼ in., Square Twisted 1¼ in., or less.

For hot Bending: Flat 1 x 2 in., Round 1¾ in., Square 1½ in., Square Twisted 1½ in., or less.

PIPE BENDING

Both the No. 6 "U" and No. 7 "U" types of Benders can be furnished with grooved dies and grooved forms for bending any size of ordinary iron pipe as follows:

1¼ in. Standard pipe size (about 1½ in. o. d.) to 6 in. radius only.

1 in. Standard pipe size (about 1¼ in. o. d.). Any radius which you may specify from a minimum of 4 in. to a maximum of 6 in.

¾ in. Standard pipe size (about 1 in. o. d.). Any radius which you may specify from a minimum of 3 in. to a maximum of 6 in.

½ in. Standard pipe size (about ¾ in. o. d.). Any radius which you may specify from a minimum of 2 in. to a maximum of 6 in.

Radius is figured from center of circle to center of pipe.

Any degree of bend up to and including 180°.

Smaller sizes of pipe than those above can be bent on these machines, but it is more practical to use smaller machines, such as "U" benders Nos. 1 and 2.

Designed especially for heavy work, such as bending 1½ in. square bars, to any desired angle or into a "U" shape. A socket is arranged for the insertion of a piece of bar stock or pipe so the machine can be operated by direct pull instead of by ratchet. This latter feature makes it also applicable to light work. The machine can also be arranged for bending other shapes, such as Channels, "T" Iron, Angle Iron, Pipe, etc.

For bending ¾ in. round or square bars (or equivalent) or anything smaller, the ratchet handle may be thrown out of engagement and direct lever used. A rod or pipe about 4 ft. long is then inserted in the socket provided for that purpose.

In service an auxiliary ratchet lever operates a pinion against a series of teeth in the frame at a large ratio, thus developing great power.

All wearing parts are hardened.

PRICE LIST—PRICES ON APPLICATION

No. 6 "U" Bender (right-hand) complete with stand, gross 725 pounds, net 650 pounds.

No. 7 "U" Bender (left-hand) complete with stand, gross 725 pounds, net 650 pounds.

EXTRAS

Edge Bending Dies, for bending flat stock edgewise.

Angle Iron Die for bending angle iron after a "V" shaped piece has been cut from upper wing.

Angle Iron Die with Plate (suitable for bending angle iron without cutting "V" shaped piece out of one leg).

Pipe Bending Dies, Combination "A" suitable for 1¼ in. 1 in., ¾ in. ordinary iron pipe, all to one radius only.

Pipe Bending Dies, Combination "B" suitable for ¾ in., ½ in., ¼ in., and 1/8 in. ordinary iron pipe, all to one radius only.

KOEHRING BAR CUTTERS AND BENDERS



FIG. 522

KOEHRING BAR BENDER NO. 5, WILL BEND COLD BARS UP TO 1 IN. SQUARE OR TWISTED SQUARE, 1 1/4 IN. ROUND.

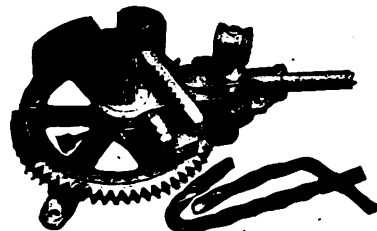


FIG. 523

KOEHRING BAR BENDER NO. 6A, WILL BEND COLD BARS UP TO 1 1/2 IN. ROUND, OR 1 1/4 IN. SQUARE TWISTED.

Koehring Bar Bender No. 5, Diameter of bending die 2 in. Radius to inside curve of bar at bend 1 in. Has roller bearing Journal. Guide block has large roller allowing bar to follow. Weight without handle, 105 lbs., handle, 40 lbs.

Koehring Bar Bender No. 6A, Diameter of bending die 3 in. Radius of inside curve of bar at bend, 1 1/2 in. Weight without handle, 225 pounds. Handle, 45 pounds. Has roller bearing Journal. Adjustable clamp automatically fits itself to thickness of bar holding bar securely at one end. Small bars can be bent by one man by direct leverage, and bigger bars by two men, using back gear attachment. Bars up to 1 1/2 in. round require no adjusting. Counter-bending requires no adjusting.

Koehring Bar Cutter, light weight, powerful, simple in construction, cutting jaws become more powerful as resistance increases. Both knives advance, leaving clean cuts without fractured ends. Stops prevent bars from twisting. Weight No. 1, without handle 100 pounds, handle 35 pounds. No. 2A without handle 185 pounds, handles, 70 pounds.

Koehring Bar Benders and Bar Cutters are built entirely of steel securing greatest strength with least possible weight. They are heavy duty tools in the same sense that Koehring Mixers are heavy duty, extra yardage mixers.

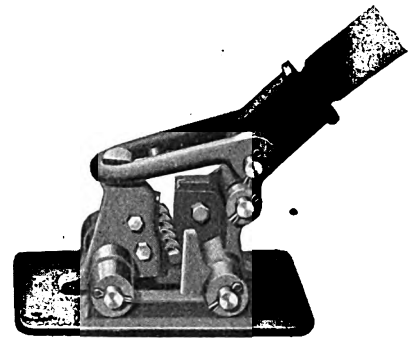


FIG. 524

KOEHRING BAR CUTTER NO. 1, ONE MAN EASILY CUTS 1/2 IN. SQUARE TWISTED OR ROUND BARS.

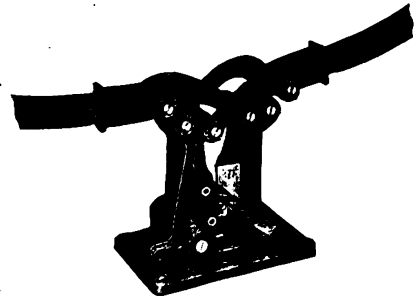


FIG. 525

KOEHRING BAR CUTTER NO. 2A, TWO MEN EASILY CUT 1 1/4 IN. SQUARE TWISTED OR 1 1/4 IN. ROUND BARS.

PRICES AND CAPACITIES.

Machine	Capacity	Weight Pounds	Price
No. 1 Bar Cutter	Shearing Square, Twisted or Round up to 3/4-inch	135	.....
No. 2A Bar Cutter	Shearing Square, Twisted up to 1 1/8 or Round 3/4 to 1 1/4-inch	255	.....
No. 5 Bar Bender	Bending Twisted 1-inch, Round 1 1/4-inch	145	.....
No. 6A Bar Bender	Bending Twisted 1 1/4-inch, Round 1 1/2-inch	224	.....

ANGLE BENDING MACHINE

NO. 11

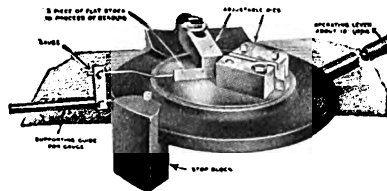


FIG. 527

This machine is intended for forming light stock into rectangular shapes without first heating the same, and can be conveniently mounted on an ordinary work bench. The illustration shows a piece of flat stock inserted ready for bending. The operating lever (of which a broken view is shown) is about 20 inches long, and by pulling this around it rotates the dies in which the stock is held, as shown in illustration, forcing the extended end of stock against the stationary back die, thus forming it to any angle desired less than 90 degrees. When a greater degree of angle is required, it may be accomplished by

means of special forming dies made to order. There is a stop block on the machine, which may be set to suit the degree of bend which is to be made.

1/8-inch or smaller Round Wire or Rod, without heating.

Capacity: 1/4-inch or smaller Square Rod, without heating.
1/8 x 1-inch or equivalent Flat Stock, without heating.

Gross weight, 80 lbs. Net weight, 60 lbs.

Price,.....

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"U" BENDING MACHINES

SUITABLE FOR BENDING ROUND, SQUARE, FLAT OR SQUARE TWISTED BARS INTO "U" SHAPE OR ANY ANGLE UP TO 180° WITH A RADIUS AT POINT OF BENDING TO CORRESPOND TO SIZE OF FORMING PIN

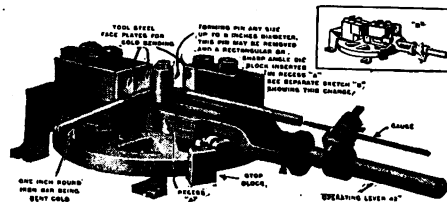


FIG. 530

"U" bends cannot exceed 8 in. over all, including stock. Inside distance between legs of "U" determines size of forming pin. Forming dies can be easily changed from one size to another.

Rectangular bends can be made by substituting rectangular front die for the round forming pin and bends up to 120° can be made. Stock as light as $\frac{1}{4}$ x 1 in. can be bent around to 145° without heating by using a special forming block.

NOTE—For hot bending ordinary dies are preferable, but for cold bending steel faced dies should be used.

When it is desired to bend flat stock of a greater width than the maximum specified for these machines we can arrange special dies to order.

CAPACITY OF NO. 1 "U" BENDER

For Cold bending: Flat $\frac{1}{4}$ x 2 in., Round $\frac{5}{8}$ in., Square Twisted $\frac{1}{2}$ in., or equivalent.

For Hot bending: Flat $\frac{1}{2}$ x 2 in., Round $\frac{3}{4}$ in., Square $\frac{3}{4}$ in., Square Twisted $\frac{3}{4}$ in., or equivalent.

CAPACITY OF NO. 2 "U" BENDER

For Cold Bending: Flat $\frac{3}{8}$ x 3 in., Round 1 in., Square $\frac{7}{8}$ in., Square Twisted $\frac{3}{4}$ in., or equivalent.

For Hot bending: Flat $\frac{5}{8}$ x 3 in., Round $1\frac{1}{4}$ in., Square $1\frac{1}{2}$ in., Square Twisted $1\frac{1}{2}$ in., or equivalent.

PRICES ON THE FOLLOWING ON APPLICATION

No. 1 "U" Bender with steel faced dies for cold bending gross, 95 pounds; net, 65 pounds.

No. 1 "U" Bender with cast iron dies for hot bending, gross, 95 pounds; net, 65 pounds.

EXTRA ROUND FORMING DIES

2 in. and under.

Over 2 in. and up to 4 in.

Over 4 in. and up to 6 in.

Over 6 in. and up to $7\frac{3}{4}$ in.

Please specify exact size of forming dies wanted, as they are not adjustable.

SPECIAL DIES

Set of Edge Bending Dies with clamping Plate.

Angle Iron Die (suitable for bending angle iron after a "V" shaped piece has been cut out of one leg of angle).

Angle Iron Die with Clamping Plate (suitable for bending angle iron without cutting "V" shaped piece out of one leg).

Pipe Bending Dies, "Equipment C" (suitable for $\frac{3}{4}$ in., $\frac{1}{2}$ in., $\frac{3}{8}$ in. and $\frac{1}{4}$ in. ordinary iron pipe).

No. 2 "U" Bender, with steel faced dies for Cold bending gross, 235 pounds; net, 185 pounds.

No. 2 "U" Bender, with cast iron dies for Hot bending, gross 235 pounds; net, 185 pounds.

EXTRA ROUND FORMING DIES

2 in. and under.

Over 2 in. and up to 4 in.

Over 4 in. and up to 6 in.

Over 6 in. and up to $7\frac{3}{4}$ in.

SPECIAL DIES

Set of Edge Bending Dies with Clamping Plate.

Angle Iron Die (suitable for bending angle iron after a "V" shaped piece has been cut out of one leg of angle).

Angle Iron Die with Clamping Plate (suitable for bending angle iron without cutting "V" shaped piece out of one leg).

Pipe Bending Dies, "Equipment D" (suitable for 1 in., $\frac{3}{4}$ in. and $\frac{1}{2}$ in., ordinary iron pipe).

Pipe Bending Dies, "Equipment E" (suitable for $\frac{3}{4}$ in., $\frac{1}{2}$ in., $\frac{3}{8}$ in. and $\frac{1}{4}$ in. ordinary iron pipe).

Dies designated as "Equipment C" will bend ordinary iron pipe as follows:

$\frac{3}{4}$ in. Pipe (about $1\frac{1}{8}$ in. o. d.) to 3 in. radius.

$\frac{1}{2}$ in. Pipe (about $\frac{3}{4}$ in. o. d.) to 2 in. radius.

$\frac{3}{8}$ in. Pipe (about $\frac{1}{2}$ in. o. d.) to $1\frac{1}{2}$ in. radius.

$\frac{1}{4}$ in. Pipe (about $\frac{1}{8}$ in. o. d.) to 1 in. radius.

Dies designated as "Equipment D" will bend ordinary iron pipe as follows:

1 in. Pipe (about $1\frac{1}{8}$ in. o. d.) to 4 in. radius.

$\frac{3}{4}$ in. Pipe (about $1\frac{1}{8}$ in. o. d.) to 3 in. radius.

$\frac{1}{2}$ in. Pipe (about $\frac{3}{4}$ in. o. d.) to 2 in. radius.

Dies designated as "Equipment E" will bend ordinary iron pipe as follows:

$\frac{3}{4}$ in. Pipe (about $1\frac{1}{8}$ in. o. d.) to 3 in. radius.

$\frac{1}{2}$ in. Pipe (about $\frac{3}{4}$ in. o. d.) to 2 in. radius.

$\frac{3}{8}$ in. Pipe (about $\frac{1}{2}$ in. o. d.) to $1\frac{1}{2}$ in. radius.

$\frac{1}{4}$ in. Pipe (about $\frac{1}{8}$ in. o. d.) to 1 in. radius.

Equipments "C," "D" and "E" are stock forms. Special forms to order.

RING AND PIPE BENDING MACHINES

NOS. 1 AND 2.

NO. 2 RING BENDER

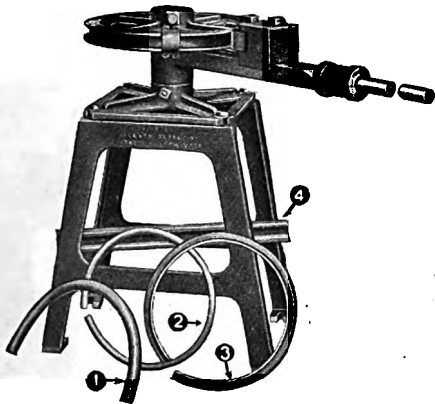


FIG. 528

from 8 inches inside measurement up to 30 inches inside measurement, and for regular 1 inch iron pipe from 12 inches inside diameter of circle up to 30 inches inside diameter of circle.

FOR FORMING FLATS, ROUNDS, SQUARES, TEES, PIPE, ANGLES AND SPECIAL SECTIONS INTO CIRCLES OR SEGMENTS OF A CIRCLE

GENERAL DESCRIPTION:

These machines are especially well adapted for bending bars, pipe and special shapes. As the success with which this work can be done depends so largely upon the section and kind of material to be formed as well as the radius of bend, we advise that full information be submitted to us before ordering. These machines are not capable of making a complete circle as the material formed will remain straight for a distance of about 2 inches at each end, and in the making of complete rings, therefore, the ends have to be formed up slightly by hand when they are being welded together. Also, in forming rings without first heating the stock, the ends will not meet, but will spring back so as to leave a gap of from one to two inches, depending on the size of material as well as diameter of circle. Specially valuable for making "U" shapes and curves of any degree.

No. 1 will form rings up to 30 in. diameter of circle (including material). No. 1 is built for light work.

Weights of machines vary greatly according to sizes of forms, but approximately are as follows:

No. 1. 215 lbs. net, 300 lbs. gross.

No. 2. 325 lbs. net, 400 lbs. gross.

No. 1 Ring Bender, complete with stand and 1 form. Price on application.

No. 2 Ring Bender, complete with stand and 1 form. Price on application.

One forming die is furnished with each machine, but additional may be obtained at extra price.

6 inches or over and not exceeding 12 inches.

Over 12 inches and not exceeding 16 inches.

Over 16 inches and not exceeding 20 inches.

Over 20 inches and not exceeding 24 inches.

Over 24 inches and not exceeding 30 inches.

Prices
on
Application

Will form rings up to 32 inches outside diameter (including material).

This machine is built for heavy work.

IN THE ILLUSTRATION OF THE NO. 2 RING BENDER, PLEASE NOTE THE FOLLOWING:

Fig. 1. 1 inch Regular Iron Pipe, 20 in. diameter of circle.

Fig. 2. $\frac{3}{4}$ in. Solid Round Steel Bar, 16 in. diameter of circle.

Fig. 3. "T" Iron, $1 \times 1 \times \frac{1}{8}$ in., 16 in. diameter of circle.

All bent without heating.

Fig. 4. "V" Bar used in connection with Iron Pipe Bending.

This bar is placed between pipe and roller and follows point of bending, thus holding up the walls of pipe to a very large degree to prevent flattening.

We do not recommend this machine for forming anything but regular iron pipe up to what is commercially known as 1 inch I. P. S. (about $1 \frac{1}{4}$ outside diameter).

"V" Bar furnished only when specially ordered at an extra price.

In cold bending the diameter of circle should be 12 inches or more for a $\frac{3}{4}$ inch solid steel bar.

For regular $\frac{3}{4}$ inch iron pipe the diameter of circle may range

STRAIGHTENING PRESS AND CENTERS

This machine is intended to be placed upon a bench and to be used when centering work by hand and for straightening work centered by hand or machine. It is a familiar fact that work straightened in a press is more likely to remain straight in the lathe, than when hammered straight, and that it is better in every way.

No.	Screw Inches	Pitch	Will center shaft		Will bend or straighten stocks up to inches	Swings circle in. over screw block	Max. Dis. Between		Weight	Price
			Dia. Inches	Length Inches			Sliding Blocks	Centers		
00	1 $\frac{3}{8}$	4	1 $\frac{1}{4}$	40	1 $\frac{3}{8}$	..	13	32	150	....
0	1 $\frac{1}{2}$	4	1 $\frac{1}{2}$	49	2 $\frac{1}{2}$	..	19	41	375	....
1	2	4	1 $\frac{3}{4}$	65	3 $\frac{1}{2}$	11	33 $\frac{1}{2}$	55	800	....

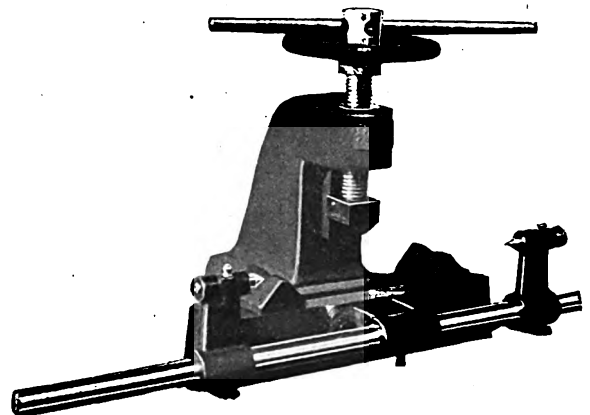
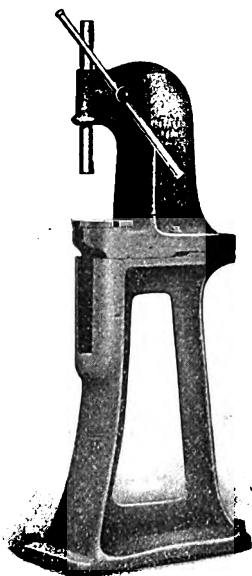
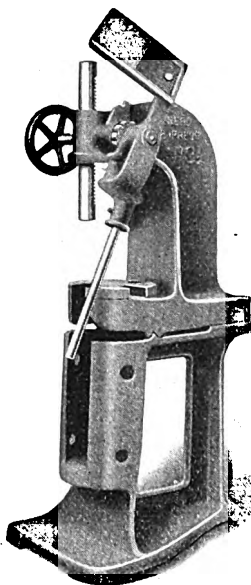


FIG. 548

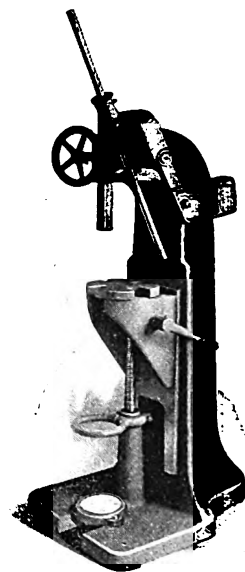
THE GREENERD ARBOR PRESS



NO. 3—FIG. 549



NO. 3½—FIG. 550



NO. 4—FIG. 551

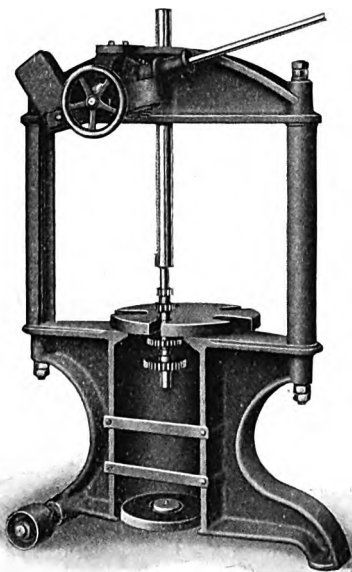


FIG. 15—NO. 552

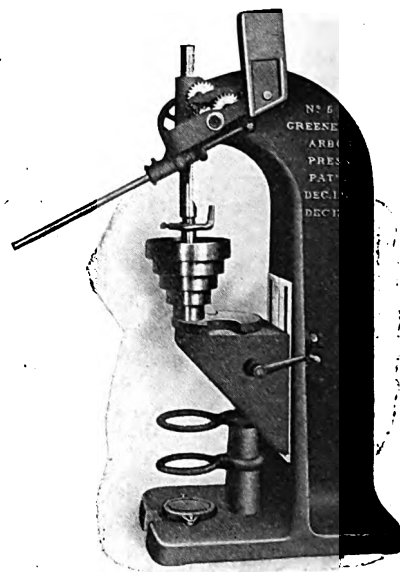
The frames of Greenerd Arbor Presses are made of strong hard iron and steel.

This mixture is known as Semi-Steel to some, for it makes a very strong casting. Methods are used that cause the shrink in casting to take place where not vital to strength.

All the Racks and Pinions are made of Special Alloy Steel. The rack stock is heat treated in the bar. The pinions are heat treated when finished. A few are tested from each lot to prove the heat treatment.

The form of gear tooth (stub tooth with angular clearance of $22\frac{1}{2}$ degrees) was designed by The Brown & Sharpe Manufacturing Co., especially for Greenerd Arbor Presses.

Hundreds of these presses are being used for purposes other than pressing arbors, such as broaching, punching, bending with dies, and many other uses.



NO. 5—FIG. 553

THE GREENERD ARBOR PRESS

THE NO. 1 PRESS.

Built to meet a call from those who wanted a small press. Useful on a grinder for forcing arbors (mandrels) into rolls, small cutters, and other small work that requires but a light pressure. Manufacturers of typewriters and instruments (electrical and mechanical) find this press very useful.

THE NO. 2 PRESS.

In specialized manufacturing it is very desirable to have a press the right size and power. A job shop can use a large press on small work. A constant repetition of the same size work calls for a press to suit the job.

THE NO. 3 PRESS.

This is the press commonly used for 14 to 16-inch lathes driving arbors to 1½-inches in diameter. More of this same size press has been sold than any other. This press is as important to a lathe doing arbor work as a vise is to a bench. The lever is 24 inches long, leverage 45 to 1. One man can easily exert 5,000 to 6,000 pounds with the No. 3 Press. Movement of rack 11¼ inches.

THE NO. 3A PRESS.

Has the same power as the No. 3 Press but has a greater capacity, taking diameters of 24 inches.

THE NO. 3½ PRESS.

This size and all larger presses have a ratchet and pawl in connection with the lever where most advantageous. The weight returns the lever to an upright position and holds it there against a stop. While in this position the pawl is shed from the ratchet and the rack can be moved up or down by the hand wheel. The lever, as with all presses using this construction, can be lengthened or shortened to suit.

THE NO. 3¾ PRESS.

This press is the same design as the No. 3½ excepting it is 21 inches over the plate, and will receive diameters of 22 inches. The No. 3½ Stand may be used with this press. Movement of rack 19 inches.

THE NO. 4 PRESS.

The No. 4 Press has an adjustable knee tongued into the planed surface on the frame. Two studs with nuts hold the knee against the frame and a square-threaded screw of coarse pitch supports the knee in position without tightening the stud nuts. The pitch of the screw is such that the knee will not "run down" under maximum pressure. The babbitted cushion screwed to the base under the ram protects the mandrel when falling; the retaining ring holds the mandrel or shaft from falling lengthwise.

THE NO. 5 PRESS.

This press has the same frame and knee construction as the No. 4. The leverage is increased to 150 to 1. This is accomplished by means of a train of gears, acting upon two pinions which engage the rack. The gears subject to the greatest strain

are Chrome Vanadium Steel. All the gears are heat treated. With this press one man can exert ten tons pressure, two men sixteen to eighteen tons.

THE NOS. 8 & 9 PRESSES.

They have the same leverage, the only difference being in the distance between the uprights; the No. 8 is 36 inches, the No. 9 is 48 inches. The height over the plate as usually furnished is 35 inches, although this may be changed to suit special requirements at a comparatively small cost. The opening under plate is 7 inches, height of base 24 inches. The rack or ram is 4x4x54 inches long. The gear tooth form is the same as with the smaller presses. With the No. 8 or 9 Press, one man is capable of exerting 20 to 25 tons pressure, two men 35 to 40 tons.

THE NO. 7 PRESS.

This is a heavy, powerful press of the same design as the No. 5. With this press one man is able to exert 20 tons pressure, two men 35 tons. Two pinions mesh with the rack, this divides the load and throws the strain upon double the number of gear teeth. With high geared presses this is necessary.

THE NO. 13 PRESS.

This press has the same power as the No. 3, but is of a greater capacity. It is 26 inches between the side rods, 13 inches over the plate and the opening under the plate is 8 inches. This press, unlike the No. 3, has a ratchet and pawl so that the lever may be used where most advantageous. This size press is used in many polishing shops for removing the polishing wheels from the arbors, the opening under the plate being large enough to receive the polishing arbor pulley and the plate thin enough to go between the wheel and pulley. This press is also used in the assembly of machinery where the design of the No. 3 would not admit its use.

THE NOS. 14 & 15 PRESSES.

The design of the No. 15 is plainly shown by illustration. The gearing is the same as that used on the No. 5, with two pinions engaging the rack or ram. One man obtains 10 to 12 tons with the No. 15 Press. The No. 14 is of the same design, but somewhat lighter. The gearing is the same as that used on the No. 4 but one pinion engaging the ram. One man can obtain three to four tons with the No. 14. The No. 15 is recommended for automobile repair work.

THE NO. 17 PRESS.

The design and dimensions of this press are the same as the No. 15, differing only in weight and power. The power is the same as the No. 7. A 180 lb. weight hung upon the end of the lever will, by a hydraulic gauge, show that 21 tons is being exerted by the 180 lb. weight, a loss by friction of 6.67 per cent. The small friction loss of these high geared presses surprises most mechanics. A number of technical schools have tested this friction loss very carefully, and all corroborate the above test. The No. 17 is recommended for automobile repair work.

PRICES AND CAPACITIES. FOR ILLUSTRATIONS SEE PAGE 180

No.	Receives Diameters	Largest Mandrel	Height Over Plate	Size of Rack or Ram	Movement of Rack or Ram	Leverage	Height	Shipping Weight	No.	List Prices Presses	Weight Stands	List Prices Stands
1	5¼	⅞	4	7x ⅞	4⅞	25-1	8	20	1	.....	...	...
2	8	1	7¼	12x1 ⅞	8	35-1	14	85	2	.....	200	.....
3	12	1½	11	17x1 ¾	11¼	45-1	17	150	3	.....	250	.....
3-A	24	1½	11	17x1 ¾	11¼	45-1	24	280	3-A	.....	300	.....
3JBS	12	1½	14	17x1 ¾	11¼	45-1	20	200	3JBS	.....	...	.....
3½	19	3	15	19x2 ⅞	14	55-1	28	450	3½	.....	300	.....
3¾	22	3	20½	24x2 ⅞	19	55-1	36	570	3¾	.....	300	.....
4	19	3	30	22x2 ⅞	16¾	60-1	60	1,080	4	.....	...	.....
5	28	4	31	24x2 ⅞	15½	150-1	66	1,740	5	.....	...	.....
7	36	5	34	32x3 ⅞	20	250-1	75	2,550	7	.....	...	.....
8	36	7	35	56x4x4	35	250-1	76	3,000	8	.....	...	.....
9	48	7	35	56x4x4	35	250-1	78	2,800	9	.....	...	.....
13	30	1½	11	17x1 ¾	12¼	45-1	55	430	13	.....	...	.....
14	36	3	27	34x2 ⅞	25¼	60-1	65	1,080	14	.....	...	.....
15	36	4	27	34x2 ⅞	25¼	150-1	66	1,200	15	.....	...	.....
17	36	4	28	40x3 ⅞	29	250-1	70	2,400	17	.....	...	.....

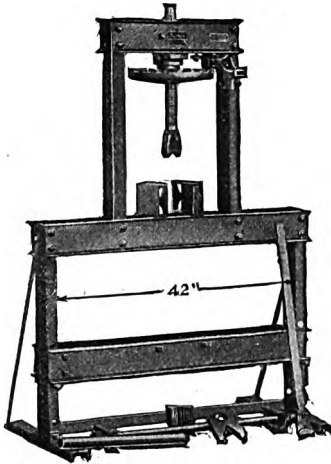
SEE OUR LINES OF GENERAL MACHINERY, PAGES 800 TO 899

YOU WILL FIND SOME VERY USEFUL INFORMATION TABLES ON PAGES NOS. 900 TO 930 INCLUSIVE

MANLEY TWENTY-TWO TON ARBOR PRESS

SCREW TYPE

FOR GARAGE, AUTOMOBILE AND SHOP USES



NO. 1, 42 INCH—FIG. 3968

The Manley Garage Presses have been designed and developed especially for auto repair work, and have certain exclusive features, range, capacity and adaptability not even approached by any other press. They are designed to handle auto repair work in the quickest and best possible way with the least effort.

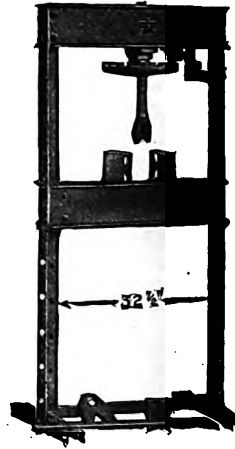
Every garage needs a press. The shop handling small car work requires a press with pressure equal to that used by the largest truck agency, but they can get along with a press large enough to handle smaller size work.

The Manley line of presses offers the auto repairman opportunity to select the size of press in keeping with his class of work and at corresponding difference in price.

Manley presses are ALL 22 ton presses, and all have the exclusive Manley features, high power leverage; high speed—high power leverage; the exposed screw which may be struck in extreme cases when pressure fails; quick changing tables; bolted construction; etc.

The only difference is size, not pressure.

They are built throughout of heavy steel channels rigidly bolted together.



NO. 2, 32 INCH—FIG. 3969

EXCLUSIVE FEATURES

High power ratchet leverage of 2200-5000 to 1 for heavy work, powerful—gives tremendous pressure. Change in leverage instantly made (no bolts to remove) to the High Speed-High Power Sensitive leverage of 1000-1 for light work, quick—saves time, effort and damage to work. Especially desirable for straightening work.

Horizontal stroke—more powerful. A man can pull more than his weight.

42-inch press takes in truck wheel with solid tire.

Tables are a unit construction, and position is quickly changed by removing two pins. No bolts or nuts. Have wide surface to properly support work.

Screw 2 inches in diameter, 4 pitch Acme thread, 12-inch travel and does not revolve.

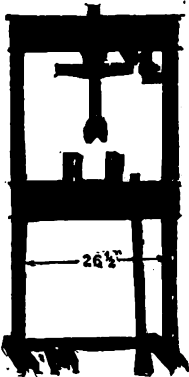
Channel blocking is braced.

"V" face plate automatically adjusts itself to any size shaft or hub.

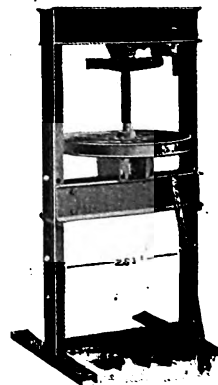
Bolted construction, possible to admit frame, etc., under screw to straighten.

Screw exposed at top—may be struck a blow in extreme cases when pressure alone fails.

Test centers converting any Manley Press into straightening press can be had at small cost.



NO. 3, 26 INCH—FIG. 3970



26-INCH PRESS WITH
30x3 IN. FORD WHEEL
FIG. 5068

EQUIPMENT

Complete equipment furnished with each press, as follows:

Operating lever; 2 braced channel blocks; "V" face plate with capacity up to 3 inches; "V" nose for screw; vise block; extension piece for screw for lower table work; threaded tie-rod.

32-inch and 26-inch presses have same equipment with exception of tie-rod and extension piece for screw, which are unnecessary.

MANLEY TWENTY-TWO TON ARBOR PRESS

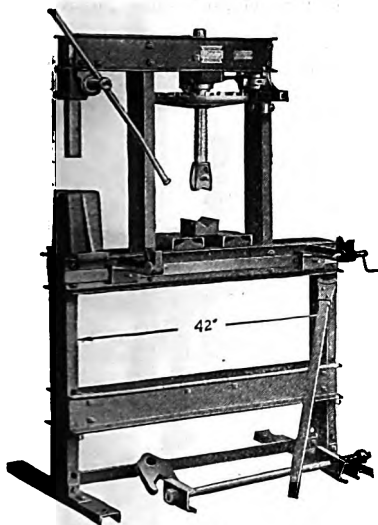


FIG. 3972

42"—22 Ton Press equipped with Rack and Pinion Press Attachment and Test Centers.

RACK AND PINION PRESS ATTACHMENT

This High Speed Rack and Pinion Press Attachment may be had on any Manley Press.

For light work, bushing, pins, etc., it is invaluable.

Capacity—Takes work up to 20 inches in diameter.

Leverage—44 to 1. One man can exert $3\frac{1}{2}$ to 5 tons pressure.

TEST CENTERS

These test centers may be had as an attachment on any Manley Press. They are indispensable in straightening work. They are provided with two 60 degree centers, one fixed, the other adjustable.

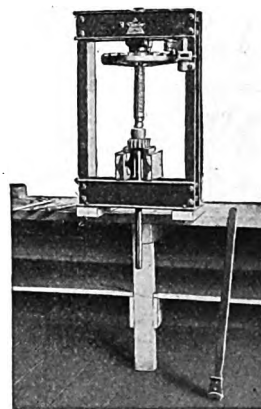
Take work 20 inches in diameter and up to 42 inches in length between centers and any length on V Blocks, which are furnished because most automobile work has no center holes.

BENCH PRESS

This Press is the top half of the 42" Press and is intended to be mounted on a Bench, as shown in cut, or some other suitable support. It has capacity in width and distance under the screw to handle a very large proportion of garage work. It is intended for those garages and shops who must have a Press at a low price to meet their present needs and carries this tremendous advantage. If at any future date it is desired to purchase the bottom half of the 42" Press this can be done at an additional cost, making the total only a small amount more than the original cost of the complete Press. Being built to jigs they will fit perfectly. This Press is also offered to those garages and shops which already have a Press but feel the need of an additional Press to handle the work more quickly and also those who may have a geared arbor Press not having the proper capacity in pressure to meet all conditions of work. Every feature of the 42" Press is found in this Bench Press as far as it applies. It has the same screw, the same hand wheel, the same two-leverages and the same specifications as the 42" Press. Rack and pinion press attachment and test centers can be had for this bench press. Equipment furnished: Operating lever, two braced channel blocks, "V" Plate, "V" nose for screw and vise block.

SPECIFICATIONS

Number	Size, inches	Takes Work, Length under Screw, inches	Weight, lbs.	Price
1	42	46	475	.....
2	32	46	425	.....
3	26	38	325	.....
4	18½	19	250	.....



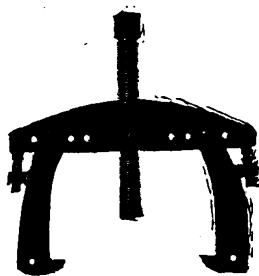
NO. 4, BENCH—FIG. 3971

CRANE IMPROVED PATENT WHEEL AND GEAR PULLER

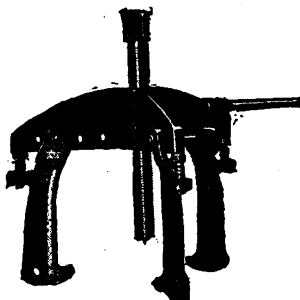
A powerful, efficient tool for quickly and safely removing Automobile and Truck Wheels, Gears, Flywheels, Cams, Collars, Sprockets, etc., bending Pipe and straightening Shafting.

Built throughout of the highest grade materials and especially designed to withstand the rough usage and abuse incidental to ordinary repair shop practice.

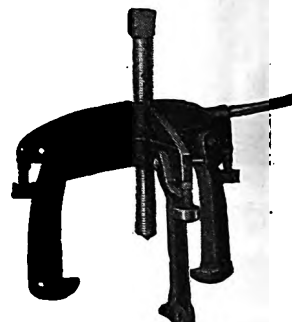
Crane Pullers are made in four different sizes: No. 0, No. 2, No. 3, and No. 3X; and three styles: Two-Arm Pullers, Three-Arm Pullers and a combined Two-Arm and Three-Arm style called Crowfoot Pullers.



TWO-ARM—FIG. 3957



THREE-ARM—FIG. 3958



CROWFOOT—FIG. 3959

NO. 0

For small, light work, such as timing gears, etc. Made in the two-arm style only. Takes diameters up to 6 inches. Equipped with one set of 3-inch locking arms.

NO. 2

Regular garage size, for Fords and medium weight cars. Made in all three styles. Takes diameters up to 11 inches. Equipped with one set of 6-inch locking arms, one set of 10-inch locking arms, or one set of 6-inch and one set of 10-inch locking arms.

NO. 3

Heavy car and truck size. Made in all three styles. Takes diameters up to 16 inches. Equipped with one set of 7-inch locking arms, one set of 11-inch locking arms, or one set of 7-inch and one set of 11-inch locking arms.

NO. 3X

Extra large size for work of large diameter. Made in two-arm and three-arm styles only. Two-arm puller takes diameters up to 20 inches, three-arm puller up to 26 inches. Have same arm equipment as regular No. 3 tools.

Locking arms, inches.....	3	6	6 & 10	7	7 & 11	10	11
Puller No.							
0 Two-Arm.....	\$2.50						
2 Two-Arm.....		\$6.80	\$ 9.60			\$ 7.60	
2 Three-Arm.....		8.80	13.00			10.00	
2 Crowfoot.....		9.60	13.80			10.80	
3 Two-Arm.....				\$ 8.40	\$11.60		\$ 9.20
3 Three-Arm.....				10.80	15.60		12.00
3 Crowfoot.....				12.30	17.10		13.50
3X Two-Arm.....				10.40	13.60		11.20
3X Three-Arm.....				18.16	22.96		19.36

EXTRA PARTS

No. 2 Screw.....	\$2.00	No. 2 Two-Arm Beam.....	\$2.56
No. 2 6-inch Locking Arm.....	1.00	No. 2 Three-Arm Beam.....	3.34
No. 2 10-inch Locking Arm.....	1.40	No. 2 Crowfoot Beam.....	4.14
No. 3 Screw.....	2.20	No. 3 Two-Arm Beam.....	3.56
No. 3 7-inch Locking Arm.....	1.20	No. 3 Three-Arm Beam.....	4.44
No. 3 11-inch Locking Arm.....	1.60	No. 3 Crowfoot Beam.....	5.94
No. 3X Two-Arm Beam.....	5.56	No. 3X Three-Arm Beam.....	12.00

No. 2 and No. 3 Pins. Each.....\$0.06

CRANE PULLERS NEW SPECIAL ATTACHMENT FEATURES

ARBOR PRESS BASE ATTACHMENT

Makes an extremely powerful Arbor Press with a Two-Arm or a Crowfoot Puller. Bolts to the bench and puller can be attached in a moment by means of two case-hardened set screws.

HEAVY TRUCK WHEEL ATTACHMENT

For removing heavy spoked wheels. Used with all styles of Pullers.

STUD FORK ATTACHMENT

Used with any style puller for removing solid web flywheels, gears, etc. Studs used are headless, case-hardened set screws.

PIPE BENDING ATTACHMENT

For use with a Two-Arm or Crowfoot Puller for bending pipe, straightening shafting, and removing Universal Joint Yokes.

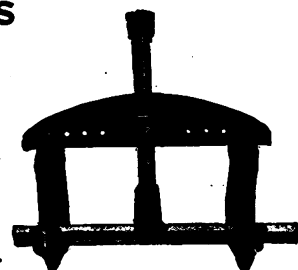


FIG. 3962
PIPE BENDING ATTACHMENT

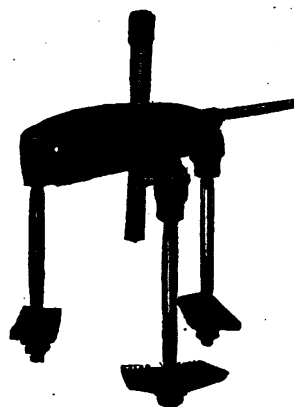


FIG. 3963
HEAVY TRUCK WHEEL
ATTACHMENT

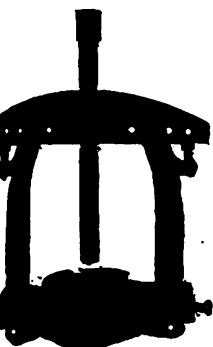


FIG. 3960
ARBOR PRESS
BASE ATTACHMENT

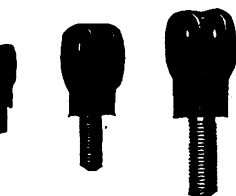


FIG. 3961
STUD FORK ATTACHMENT

Attachment, No.	List Price	Attachment, No.	List Price
2 Base, only.....	\$5.50	0 Stud Fork, each	\$0.30
3 Base, only.....	7.50	2 " " "	.75
2 Two-Arm Truck....	3.20	3 " " "	1.00
2 Three-Arm Truck....	4.80	2 Pipe Bending	2.75
3 Two-Arm Truck....	5.60	3 " " "	3.50
3 Three-Arm Truck....	8.40		

"LITTLE GIANT" GEAR AND WHEEL PULLERS

The Little Giant is the most practical device for removing gears' flywheels, pulleys, countershafts, automobile wheels and in fact any work of this nature required in the machine shop. It has more range than two ordinary pullers and is more quickly adaptable to any class of work. For example: It can be successfully used in pulling small gears where the space is very limited between the gear and gear case. For gears, pulleys, etc., less than three inches in diameter, it will be necessary to employ extension arms having only one pulling prong, which fit right over the prongs on each of the two arms of the puller as shown in the diagram.

Price, Little Giant Puller.....\$10.00

Price, complete with extension arms..... 11.00

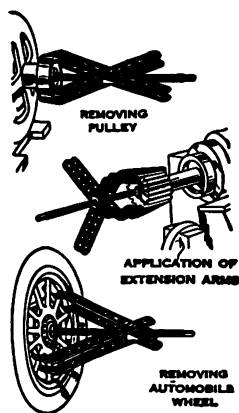


FIG. 545

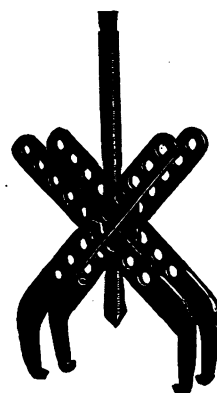
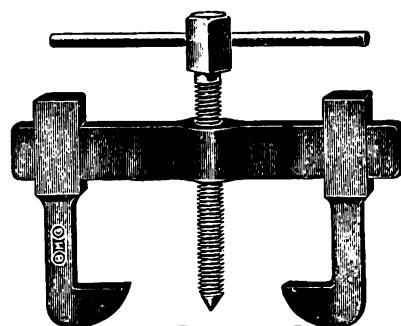


FIG. 546

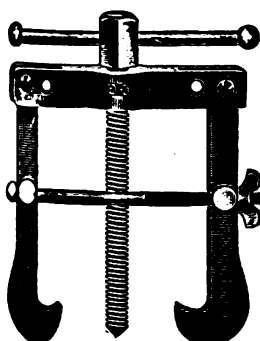
B-M GEAR AND WHEEL PULLERS

These pullers are made entirely of steel, exceedingly strong, with a machine cut screw, heat treated. The method of adjusting the arms or pullers of Nos. 7 & 8 for the desired spread is by means of the yoke or cross bar sliding through a broached oblong hole in the arms, thus providing a direct dead center pull against the part to be removed.

Number.....	5	7	8
Maximum reach, in.....	5	2 3/8	5
Maximum spread inside, in.....	14	6 1/2	6 1/2
Weight, lbs.....	4	4	5
Price complete.....	\$3.00	\$3.50	\$4.75



NOS. 7 AND 8, FIG. 3964



NO. 5, FIG. 547

MANLEY ENGINE STANDS

STATIONARY AND PORTABLE

MOUNT 3 AND 4 POINT SUSPENSION MOTORS

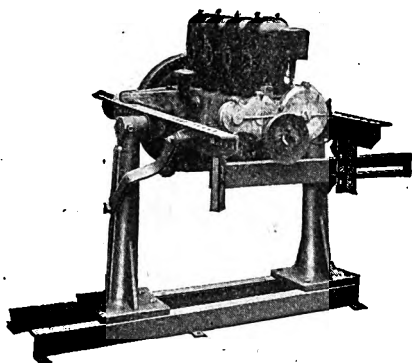


FIG. 556

Motor can be turned instantly and locked rigidly in any position throughout 360 degrees.

Base is narrow so mechanic can stand right up against engine and work in natural position without interference.

The mechanic can work on any part of engine without stooping or cramping and do better and more work, saving time, which means money.

These stands are built plain and geared, portable and stationary in two sizes. Regular for most all motors. Extra heavy for larger Commercial Car motors.

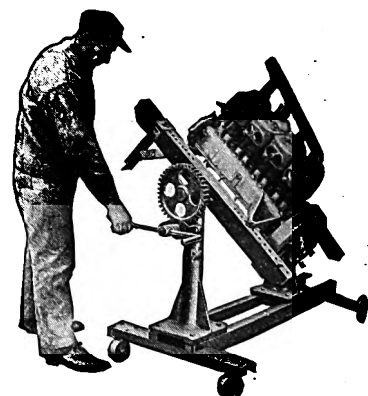


FIG. 3973

SPECIFICATIONS

	Length Base, in.	Height to Top of Cross Arms, in.	Length Cross Arms, in.	Weight, lbs.		Price	
				Plain	Geared	Plain	Geared
Regular Type							
No. 151 Stationary	54	30	44	245	....	....	....
No. 152 Stationary	54	30	44	....	265	....	....
No. 155 Portable	54	33	44	260	....	....	....
No. 156 Portable	54	33	44	....	280	....	....
Commercial Type							
No. 161 Stationary	54	36	54	300	....	....	....
No. 162 Stationary	54	36	54	....	320	....	....
No. 165 Portable	54	39	54	325	....	....	....
No. 166 Portable	54	39	54	....	345	....	....

MANLEY FORD ENGINE STANDS

STATIONARY AND PORTABLE

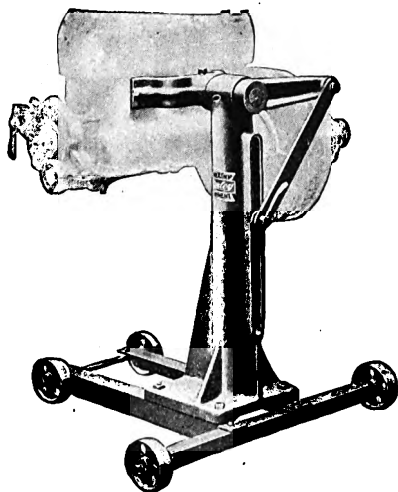


FIG. 3974

The new Manley Ford Motor Stand is the most wonderful engine stand for Ford repair work ever invented.

With this simple gripping method the complete power plant,—Cylinder Block, Magneto Case, Oil Pan—is merely slid over spindle against yoke, one nut tightened and the complete power plant is mounted ready to go to work on.

Absolutely no strain on water jacket or cylinders.

The motor actually hangs suspended in the air.

Every part is easily accessible.

The U-Shaped yoke even permits access to center bearing bolts, an operation impossible in any other construction.

Motor is gripped in center and turns over like a pulley and is instantly locked rigidly in any position.


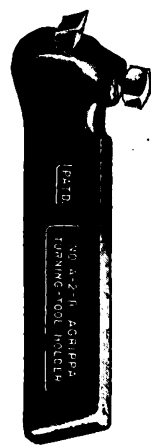
No. 182 Portable, weight, 120 lbs.—List Price.....

No. 181 Stationary, weight, 100 lbs.—List Price.....

WILLIAMS "AGRIPPA" TURNING TOOL HOLDERS

"THE HOLDERS THAT HOLD"

STRAIGHT AND OFFSET SHANK

No.	No.	No.	Holder, Size	Cutter Size Sq.	PRICE	
					Cutter Only	Complete
Offset Left Hand	Offset Right Hand	Straight Shank			High Speed	With High Speed Cutter
A00-L	A00-R	A00-S	$\frac{5}{16} \times \frac{3}{4} \times 4\frac{1}{2}$	$\frac{3}{16}$	\$0.15	\$1.80
A0-L	A0-R	A0-S	$\frac{3}{8} \times \frac{1}{2} \times 5$	$\frac{1}{4}$	.22	1.90
A1-L	A1-R	A1-S	$\frac{1}{2} \times 1\frac{1}{8} \times 6$	$\frac{5}{16}$	.35	2.15
A2-L	A2-R	A2-S	$\frac{5}{8} \times 1\frac{3}{8} \times 7$	$\frac{3}{8}$	.60	2.70
A3-L	A3-R	A3-S	$\frac{3}{4} \times 1\frac{5}{8} \times 8$	$\frac{7}{16}$	.90	3.60
A4-L	A4-R	A4-S	$\frac{7}{8} \times 1\frac{3}{4} \times 9$	$\frac{1}{2}$	1.30	4.60
A5-L	A5-R	A5-S	1 x 2 x 11	$\frac{5}{8}$	2.35	6.50

FIG. 5066

FIG. 5067

Furnished with Set Screw, Hardened Wrench and one High Speed Cutter.


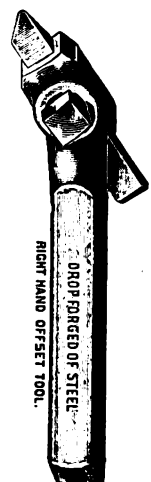
The Diamond Point form in which Cutters are furnished requires the minimum of grinding for either right or left hand usage.

ARMSTRONG TURNING TOOL HOLDERS

STRAIGHT AND OFF-SET SHANK



FIG. 566

Left Hand No.	Straight Shank No.	Right Hand No.	Size of Holder Inches	Size of Cutters Inches Square	Extra Cutters Each	Price Each Complete
00-L	00-S	00-R	$\frac{1}{4} \times \frac{3}{4} \times 4\frac{1}{2}$	$\frac{1}{16}$	\$0.25	\$ 1.80
0-L	0-S	0-R	$\frac{5}{16} \times \frac{1}{2} \times 5$	$\frac{1}{4}$	.30	1.90
1-L	1-S	1-R	$\frac{1}{2} \times 1\frac{1}{8} \times 6$	$\frac{5}{16}$	.45	2.15
2-L	2-S	2-R	$\frac{5}{8} \times 1\frac{3}{8} \times 7$	$\frac{3}{8}$	.65	2.70
3-L	3-S	3-R	$\frac{3}{4} \times 1\frac{5}{8} \times 8$	$\frac{7}{16}$	1.00	3.60
4-L	4-S	4-R	$\frac{7}{8} \times 1\frac{3}{4} \times 9$	$\frac{1}{2}$	1.45	4.60
5-L	5-S	5-R	1 x 2 x 11	$\frac{5}{8}$	2.50	6.50
6-L	6-S	6-R	$1\frac{1}{4} \times 2\frac{1}{4} \times 13$	$\frac{3}{4}$	4.10	9.00
7-L	7-S	7-R	$1\frac{1}{2} \times 2\frac{1}{2} \times 16$	$\frac{7}{8}$	6.00	15.00
750-L	750-S	750-R	$1\frac{3}{4} \times 2\frac{3}{4} \times 18$	1	8.60	22.00
800-L	800-S	800-R	$1\frac{3}{4} \times 3 \times 20$	$1\frac{1}{8}$	11.90	28.50

Complete with Wrench and One High Speed Cutter.

FIG. 567

WILLIAMS "AGRIPPA" DROP-HEAD TURNING-TOOL HOLDERS

WITH RIGHT AND LEFT HAND OFFSET AND STRAIGHT SHANKS

"THE HOLDERS THAT HOLD"



FIG. 576



FIG. 577

Furnished with either Hexagon Head or Headless Cam, Hardened Wrench and one High Speed Cutter.

Designed for use on Lathes with Clamp-tool Rests and low centers, and excellently adapted for Shaper and Planer work. Both types of cams are interchangeable, and extra Cams can be furnished at a slight charge.

The "Diamond Point" form in which Cutters are furnished requires the minimum of grinding for either right or left hand usage.

Unless otherwise specified Hex Head Cam will be furnished.

Left Hand Number	Right Hand Number	Holder, Size	Cutter Size, Square	Height from Bottom of Shank to Cutter Point	PRICE			
					Extra Inter- changeable Cams, Each	Cutters only	Complete Tool	
						High Speed	With High Speed Cutter	
OFF-SET SHANKS								
0200-L	0200-R	$\frac{1}{16} \times \frac{9}{16} \times 5\frac{3}{4}$	$\frac{3}{16}$	$\frac{9}{16}$	\$0.60	\$0.15	\$1.90	
200-L	200-R	$\frac{1}{16} \times \frac{1}{16} \times 6\frac{5}{8}$	$\frac{1}{4}$	$\frac{1}{16}$	.66	.22	2.25
201-L	201-R	$\frac{3}{4} \times \frac{1}{8} \times 7\frac{5}{8}$	$\frac{1}{8}$	$\frac{1}{16}$	.73	.35	2.85
202-L	202-R	$\frac{7}{8} \times 1 \times 8\frac{1}{2}$	$\frac{3}{8}$	$\frac{1}{16}$	.81	.60	3.65
204-L	204-R	$1\frac{1}{8} \times 1\frac{1}{4} \times 10\frac{1}{2}$	$\frac{1}{2}$	$1\frac{1}{16}$	1.00	1.30	5.80	
STRAIGHT SHANK								
0200-S		$\frac{1}{16} \times \frac{9}{16} \times 6$	$\frac{3}{16}$	$\frac{9}{16}$	\$0.60	\$0.15	\$1.90	
200-S		$\frac{1}{16} \times \frac{1}{16} \times 6\frac{7}{8}$	$\frac{1}{4}$	$\frac{1}{16}$	.66	.22	2.25
201-S		$\frac{3}{4} \times \frac{1}{8} \times 7\frac{5}{8}$	$\frac{1}{8}$	$\frac{1}{16}$	.73	.35	2.85
202-S		$\frac{7}{8} \times 1 \times 8\frac{1}{2}$	$\frac{3}{8}$	$\frac{1}{16}$	.81	.60	3.65
204-S		$1\frac{1}{8} \times 1\frac{1}{4} \times 11$	$\frac{1}{2}$	$1\frac{1}{16}$	1.00	1.30	5.80	

ARMSTRONG DROP HEAD TOOL HOLDERS

[STRAIGHT AND OFF-SET SHANK

LEFT HAND OFF-SET

STRAIGHT SHANK

RIGHT HAND OFF-SET

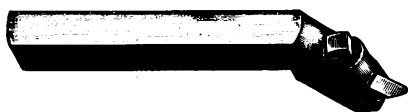


FIG. 568



FIG. 569



FIG. 570

Head and screw are extra heavy, and the cutter point, while retaining the correct cutting angle, is dropped to a position suitable for use on lathes with high slide rest or low centers, while its "Goose Neck" shape makes it exceptionally efficient when used on the planer.

PRICE LIST

Complete with Wrench and One High Speed Cutter

Left Hand Off-Set Number	Straight Shank Number	Right Hand Off-Set Number	Size of Holder Inches	Size Cutter Inch	Height of Cutter Point	Extra Cutters Each	Price Each Complete
100-L	100-S	100-R	$\frac{1}{2} \times \frac{5}{8} \times 6$	$\frac{1}{8}$	$\frac{1}{8}$	\$0.25	\$1.90
101-L	101-S	101-R	$\frac{5}{8} \times \frac{3}{4} \times 7\frac{1}{2}$	$\frac{1}{4}$	$\frac{1}{8}$	.30	2.25
201-L	201-S	201-R	$\frac{3}{4} \times \frac{1}{8} \times 8\frac{1}{2}$	$\frac{1}{8}$	$\frac{1}{8}$	.45	2.85
102-L	102-S	102-R	$\frac{7}{8} \times 1 \times 9\frac{1}{2}$	$\frac{3}{8}$	$\frac{1}{8}$	.65	3.65
301-L	301-S	301-R	$1 \times 1\frac{1}{8} \times 10\frac{1}{2}$	$\frac{1}{2}$	$1\frac{1}{8}$	1.00	4.60
103-L	103-S	103-R	$1\frac{1}{8} \times 1\frac{1}{4} \times 11\frac{1}{2}$	$\frac{1}{2}$	$1\frac{1}{8}$	1.45	5.80
104-L	104-S	104-R	$1\frac{1}{8} \times 1\frac{1}{2} \times 13\frac{1}{2}$	$\frac{3}{4}$	$1\frac{1}{8}$	2.50	8.60
105-L	105-S	105-R	$1\frac{1}{8} \times 1\frac{3}{4} \times 15\frac{1}{2}$	$\frac{3}{4}$	$1\frac{1}{2}$	4.10	13.80
106-L	106-S	106-R	$1\frac{1}{8} \times 2 \times 17\frac{1}{2}$	$\frac{1}{8}$	$1\frac{3}{4}$	6.00	20.50
107-L	107-S	107-R	$2\frac{1}{8} \times 2\frac{1}{4} \times 19\frac{1}{2}$	1	2	8.60	27.50

ARMSTRONG SIDE TOOLS

OFF-SET SHANK

The design of the Armstrong Side Tools is typical of the entire Armstrong system of Tool Holders, embodying the prime needs of a practical lathe tool, viz., convenience, simplicity and strength.

Each Tool is boxed separately and price includes Wrench and one High Speed Cutter.

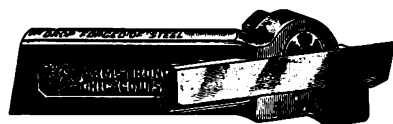


FIG. 578

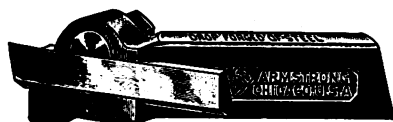


FIG. 579

No.	No.	Size of Shank Inches	Weight Each Pounds	Extra Cutters Each	Price Each Complete
69-L	69-R	$\frac{1}{8} \times \frac{3}{4}$	$\frac{5}{8}$	\$0.60	\$1.90
70-L	70-R	$\frac{3}{8} \times \frac{7}{8}$	$\frac{3}{4}$	.90	2.25
71-L	71-R	$\frac{1}{2} \times 1\frac{1}{8}$	$1\frac{1}{2}$	1.40	2.95
72-L	72-R	$\frac{5}{8} \times 1\frac{3}{8}$	$2\frac{1}{4}$	2.30	4.00
73-L	73-R	$\frac{3}{4} \times 1\frac{5}{8}$	$3\frac{1}{2}$	3.40	5.25
74-L	74-R	$\frac{7}{8} \times 1\frac{3}{4}$	6	5.00	7.10
75-L	75-R	1 x 2	$8\frac{1}{2}$	6.00	8.50
76-L	76-R	$1\frac{1}{4} \times 2\frac{1}{4}$	$12\frac{1}{4}$	7.90	11.00

STRAIGHT SHANK

These Straight Shank Side Tools are well adapted to use on the Planer and Shaper for many classes of work on which they will be found exceptionally convenient and efficient.

Each Tool is boxed separately and price includes Wrench and one High Speed Cutter.

No.	No.	Size of Holder Inches	Weight Each Pounds	Extra Cutters Each	Price Each Complete
79-L	79-R	$\frac{1}{8} \times \frac{3}{4} \times 4\frac{1}{2}$	$\frac{5}{8}$	\$0.60	\$1.90
80-L	80-R	$\frac{3}{8} \times \frac{7}{8} \times 5$	$\frac{3}{4}$	.90	2.25
81-L	81-R	$\frac{1}{2} \times 1\frac{1}{8} \times 6$	$1\frac{1}{4}$	1.40	2.90
82-L	82-R	$\frac{5}{8} \times 1\frac{3}{8} \times 7$	$1\frac{3}{4}$	2.30	4.00
83-L	83-R	$\frac{3}{4} \times 1\frac{5}{8} \times 8$	$3\frac{1}{4}$	3.40	5.25
84-L	84-R	1 x $1\frac{3}{4} \times 9$	5	5.00	7.10
85-L	85-R	$1\frac{1}{8} \times 2 \times 11$	$7\frac{1}{2}$	6.00	8.50
86-L	86-R	$1\frac{1}{4} \times 2\frac{1}{4} \times 13$	11	7.90	11.00
87-L	87-R	$1\frac{1}{2} \times 2\frac{3}{8} \times 15$	16	10.00	15.75



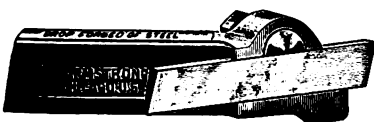
FIG. 580



FIG. 581

ARMSTRONG CUTTING-OFF TOOLS

STRAIGHT AND OFF-SET SHANK



LEFT-HAND TOOL—FIG. 573



STRAIGHT TOOL—FIG. 574



RIGHT-HAND TOOL—FIG. 575

The nature of the work renders occasional breaking of cutting-off tools unavoidable and in the case of forged tools this involves re-forging and grinding, the lathe meanwhile standing idle; with the Armstrong Cutting-Off Tool the delay is but momentary, as the blade can be extended and point sharpened in a few minutes. The blades are beveled on both sides and are held on an angle with proper clearance and rake to insure a clean cutting tool.

Price includes Wrench and One High Speed Cutter.

Left Hand Off-Set Number	Straight Shank Number	Right Hand Off-Set Number	Size of Holder Inches	Size of Cutter, Inches	Extra Cutters Each	Price Each Complete
29-L	19	29-R	$\frac{1}{8} \times \frac{3}{4}$	$\frac{5}{8} \times \frac{1}{2}$	\$0.60	\$1.90
30-L	20	30-R	$\frac{3}{8} \times \frac{7}{8}$	$\frac{3}{4} \times \frac{5}{8}$	.65	2.00
31-L	21	31-R	$\frac{1}{2} \times 1\frac{1}{8}$	$\frac{1}{2} \times \frac{3}{4}$	.90	2.40
32-L	22	32-R	$\frac{5}{8} \times 1\frac{3}{8}$	$\frac{5}{8} \times \frac{7}{8}$	1.30	3.00
33-L	23	33-R	$\frac{3}{4} \times 1\frac{5}{8}$	$\frac{3}{4} \times 1$	2.15	4.00
34-L	24	34-R	$\frac{7}{8} \times 1\frac{3}{4}$	$\frac{7}{8} \times 1\frac{1}{8}$	2.90	5.00
35-L	25	35-R	1 x 2	$\frac{1}{4} \times 1\frac{1}{4}$	4.00	6.50
36-L	26	36-R	$1\frac{1}{4} \times 2\frac{1}{4}$	$\frac{1}{4} \times 1\frac{3}{8}$	4.65	7.75

In ordering blades, state whether same are for use in straight, right or left-hand tool.

WILLIAMS "AGRIPPA" CUTTING-OFF AND SIDE-TOOL HOLDERS

FOR INTERCHANGEABLE BLADES. RIGHT AND LEFT HAND OFF-SET AND RIGHT HAND STRAIGHT SHANKS

"THE HOLDERS THAT HOLD"



FIG. 571



FIG. 572

Furnished with either Hexagon Head or Headless Cam, Blade and Hardened Wrench.

Both types of Cam are interchangeable, and extra Cams can be furnished at a slight charge.

The Cutter Blades are furnished from High Speed Steel and ground ready for use.

Unless otherwise specified, a High-Speed Steel Cutting-off Blade and Hex Head Cam will be furnished with the Holder.

Number Left Hand	Number Right Hand	Holder Size	Cutter Blade Finished Size		PRICE			
			Cutting- off Tool	Side Tool	Extra Cutting- off Tool Blade Finished High Speed	Extra Side- Tool Blade Finished High Speed	Complete Holder	
							With Cutting- off Tool Blade High Speed	With Side- Tool Blade High Speed
OFFSET SHANKS								
030-L	030-R	$\frac{1}{8} \times \frac{3}{8} \times 4\frac{3}{8}$	$\frac{1}{8} \times \frac{1}{2}$	$\frac{1}{8} \times \frac{1}{2}$	\$0.60	\$0.60	\$1.90	\$1.90
30-L	30-R	$\frac{3}{8} \times \frac{1}{8} \times 5$	$\frac{3}{8} \times \frac{5}{8}$	$\frac{3}{8} \times \frac{5}{8}$	.65	.90	2.00	2.25
31-L	31-R	$\frac{1}{2} \times 1\frac{1}{8} \times 6\frac{1}{8}$	$\frac{1}{8} \times \frac{3}{4}$	$\frac{1}{8} \times \frac{3}{4}$	.90	1.40	2.40	2.90
32-L	32-R	$\frac{5}{8} \times 1\frac{1}{8} \times 7$	$\frac{1}{8} \times \frac{7}{8}$	$\frac{1}{4} \times \frac{7}{8}$	1.30	2.30	3.00	4.00
33-L	33-R	$\frac{3}{4} \times 1\frac{5}{8} \times 8\frac{1}{4}$	$\frac{1}{8} \times 1$	$\frac{1}{8} \times 1$	2.15	3.40	4.00	5.25
34-L	34-R	$\frac{7}{8} \times 1\frac{3}{4} \times 9\frac{1}{8}$	$\frac{1}{8} \times 1\frac{1}{8}$	$\frac{3}{8} \times 1\frac{1}{8}$	2.90	5.00	5.00	7.10
*35-L	*35-R	$\frac{7}{8} \times 1\frac{3}{4} \times 9\frac{1}{8}$	$\frac{1}{4} \times 1\frac{1}{8}$	.. ...	4.00	....	6.10	....
RIGHT HAND STRAIGHT SHANKS								
....	020-R	$\frac{1}{8} \times \frac{3}{8} \times 4\frac{5}{8}$	$\frac{1}{8} \times \frac{1}{2}$	$\frac{1}{8} \times \frac{1}{2}$	\$0.60	\$0.60	\$1.90	\$1.90
....	20-R	$\frac{3}{8} \times \frac{1}{8} \times 5\frac{1}{4}$	$\frac{3}{8} \times \frac{5}{8}$	$\frac{3}{8} \times \frac{5}{8}$	.65	.90	2.00	2.25
....	21-R	$\frac{1}{2} \times 1\frac{1}{8} \times 6\frac{1}{4}$	$\frac{1}{8} \times \frac{3}{4}$	$\frac{1}{8} \times \frac{3}{4}$	.90	1.40	2.40	2.90
....	22-R	$\frac{5}{8} \times 1\frac{1}{8} \times 7\frac{1}{8}$	$\frac{1}{8} \times \frac{7}{8}$	$\frac{1}{4} \times \frac{7}{8}$	1.30	2.30	3.00	4.00
....	23-R	$\frac{3}{4} \times 1\frac{5}{8} \times 8\frac{3}{8}$	$\frac{1}{8} \times 1$	$\frac{1}{8} \times 1$	2.15	3.40	4.00	5.25
....	24-R	$\frac{7}{8} \times 1\frac{3}{4} \times 9\frac{1}{8}$	$\frac{1}{8} \times 1\frac{1}{8}$	$\frac{3}{8} \times 1\frac{1}{8}$	2.90	5.00	5.00	7.10
....	*25-R	$\frac{7}{8} \times 1\frac{3}{4} \times 9\frac{1}{8}$	$\frac{1}{4} \times 1\frac{1}{8}$	.. ...	4.00	....	6.10	....

*These are 34-R and 34-L Holders fitted with No. 35 Blade, making them equivalent to No. 35 cutting-off tool.

**This is 24-R Holder fitted with No. 25 Blade, making it equivalent to No. 25 cutting-off tool.

WILLIAMS "VULCAN" FORGED-CUTTER TOOL HOLDERS

FOR LATHE, PLANER, SHAPER, ETC.

"THE HOLDERS THAT HOLD"

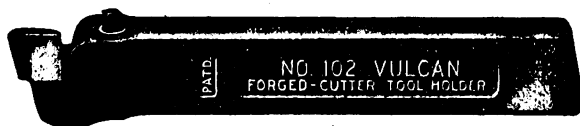


FIG. 582

FURNISHED WITH SQUARE HEAD CAM AND HARDENED SOCKET WRENCH

This is an unusually efficient tool for heavy service on Lathe, Planer, Shaper, etc., practically the equal of hand-forged, solid tools and vastly more economical.

The drop-forged Holder is composed of but three parts, all of which are so heat-treated and hardened as to develop the greatest stiffness and strength, together with the ability to resist hard wear.



FIG. 583

No.	Holder, Size	Height from Point of Cutter to Bottom of Shank	Cutter Shank, Diam- eter	PRICE	
				Extra Inter- changeable Cams, Each	Holder without Cutters
101	$\frac{1}{2} \times 1\frac{1}{8} \times 7\frac{1}{2}$	$1\frac{1}{8}$	$\frac{3}{8}$	\$0.58	\$2.75
102	$\frac{5}{8} \times 1\frac{1}{8} \times 9$	$1\frac{1}{8}$	$\frac{1}{2}$	.63	3.50
103	$\frac{3}{4} \times 1\frac{1}{8} \times 10\frac{1}{2}$	$1\frac{1}{8}$	$\frac{1}{2}$	.68	4.50
105	$1 \times 2 \times 14$	2	$\frac{1}{2}$	.84	6.75
106	$1\frac{1}{4} \times 2\frac{1}{4} \times 16$	$2\frac{1}{4}$	$\frac{3}{4}$	.95	9.00

For cutters see page 202.

WILLIAMS "AGRIPPA" PLANING-TOOL HOLDERS

"THE HOLDERS THAT HOLD"



FIG. 584



FIG. 585



FIG. 586

Fig. 584. The construction affords most ready release of cutter for adjustment.

Fig. 585. The substantial Bolt fastening, and serrated adjustment ring.

Fig. 586. The serrations in Holder indicate maximum of cutter adjustment.

Furnished with One Cutter and Hardened Drop-forged Wrench.

A rugged substantial tool of absolute efficiency and great dependability on either Lathe or Planer. Because of its numerous angles of adjustment it also makes an excellent Offset Turning Tool.

The construction assures perfect seat and holding qualities for the Cutters; the convex face of Clamp Nut provides uniform locking pressure for Cutters of either square or rectangular form; the serrations in holder provide for quicker, finer, and maximum number of Cutter adjustments.

The serrated washer, or Adjustment Ring, which receives fastening and working impact, is hardened and tempered—relieves Holder of wear. Should it wear in prolonged service a new ring only is required—not a complete holder.

No.	Holder, Size	Cutter Size	PRICE		
			Extra Adjustment Ring	Cutters Only	Complete Holder
				High Speed	High Speed Cutters
91	$\frac{1}{2} \times 1 \times 7$	$\frac{1}{4} \times \frac{3}{8}$	\$0.40	\$0.35	\$3.10
92	$\frac{5}{8} \times 1\frac{1}{4} \times 8\frac{1}{2}$	$\frac{1}{2} \times \frac{1}{2}$	.45	.55	4.00
93	$\frac{3}{4} \times 1\frac{1}{2} \times 10\frac{1}{4}$	$\frac{3}{8} \times \frac{1}{2}$	.55	.80	5.25
94	$1 \times 1\frac{3}{4} \times 13\frac{1}{4}$	$\frac{1}{2} \times \frac{3}{4}$	.70	1.95	8.25
95	$1\frac{1}{8} \times 2 \times 16\frac{1}{2}$	$\frac{5}{8} \times \frac{7}{8}$	1.00	3.35	12.75
96	$1\frac{3}{4} \times 2\frac{3}{8} \times 19$	$\frac{3}{4} \times 1$	1.50	5.25	19.50
97	$2\frac{1}{8} \times 2\frac{3}{4} \times 22$	$\frac{7}{8} \times 1\frac{1}{8}$	2.25	8.20	30.00

ARMSTRONG PLANER TOOL

PRICE LIST

Complete with Wrench and One High Speed Cutter



FIG. 587

WORKS AT ANGLE, RIGHT OR LEFT

No.	Size of Holder Inches	Size of Cutter Inches	Extra Cutters Each	Price Each Complete
40	$\frac{1}{2} \times 1 \times 6$	$\frac{1}{4} \times \frac{3}{8}$	\$0.45	\$3.10
401	$\frac{5}{8} \times 1\frac{1}{4} \times 8\frac{1}{2}$	$\frac{1}{2} \times \frac{1}{2}$	.65	4.00
41	$\frac{3}{4} \times 1\frac{1}{2} \times 10$	$\frac{3}{8} \times \frac{1}{2}$	.95	5.25
42	$1\frac{1}{8} \times 1\frac{3}{4} \times 13$	$\frac{1}{2} \times \frac{3}{4}$	2.15	8.25
43	$1\frac{3}{8} \times 2 \times 16$	$\frac{5}{8} \times \frac{7}{8}$	3.60	12.75
44	$1\frac{1}{8} \times 2\frac{1}{4} \times 19$	$\frac{3}{4} \times 1$	5.30	19.50
45	$2\frac{1}{8} \times 2\frac{3}{4} \times 22$	$\frac{7}{8} \times 1\frac{1}{8}$	8.50	30.00

ARMSTRONG GANG PLANER TOOL

FOR PLANING LARGE SURFACES

This tool is especially adapted for surfacing large castings, and on this class of work it will effect a saving of 50 to 75 per cent in the time required to do the same job with a single point tool. The head is solidly secured to the shank, upon which it swivels to a limited degree, by means of a deep and closely fitted tongue and socket, and when set its position is fixed by two steel collar screws, while two stop screws render slipping of head impossible. The head is graduated, thus enabling the tool to be quickly and accurately set to any desired feed. This makes it possible to always have the tool cutting at the greatest speed practicable on metals of varying degrees of hardness.

As each chip is comparatively light, a planer will, with this tool, carry with ease a

feed and depth of cut much greater than is possible when using an ordinary tool, and there is much less tendency to "break out" at the end of the cut.

PRICE LIST

Complete with one set (four) High Speed Cutters, Wrench and Grinding Gauge.

No	Size Shank Inches	Length Over All Inches	Size Cutter Inches	Feed Adjustment, Inches	Extra Cutters Each	Price Each Complete
61	$1\frac{1}{4} \times 1\frac{3}{4} \times 7\frac{1}{2}$	10	$\frac{3}{8} \times \frac{1}{2}$	0 to $\frac{1}{4}$	\$.85	\$13.00
62	$1\frac{1}{8} \times 2\frac{1}{4} \times 9$	12	$\frac{1}{2} \times \frac{1}{2}$	0 to $\frac{3}{8}$	1.70	22.00
63	$2 \times 2\frac{1}{2} \times 11$	14	$\frac{5}{8} \times \frac{7}{8}$	0 to $\frac{1}{2}$	2.80	38 50



FIG. 588

ARMSTRONG SLOTTER TOOL

WITH HOLLOW BAR



FIG. 589

This tool is very stiff and easily adjustable to different lengths of stroke, and can be rotated conveniently for working into corners or in different positions. It has a spring relief block which saves the cutter point from wear and tear of the return stroke, and is so constructed as to be protected from chips and dirt.

Note—As there is considerable difference in size of the T slots of machines of different manufacture, the clamps and bolt heads of this tool are made of ample size to allow for fitting.

Fitting—An extra charge will be made for fitting to dimensions.

PRICE LIST

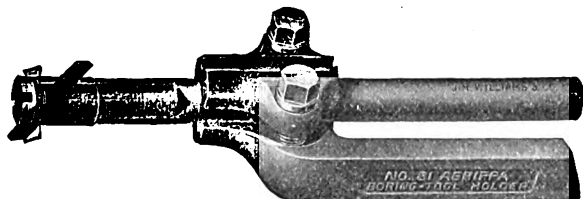
Complete with Wrench and Two High Speed Cutters

No.	For Slotting Machine Inches Stroke	Diam. of Bar Inches	Length Over All Inches	Size of Cutter Inches	Extra Cutters Each	Price Each Complete
91	6 and 8	1½	16	1/8 x 1/8	\$1.35	\$25.00
92	10 and 12	2	22	1/2 x 1/8	1.80	45.00
93	14 and 16	2¼	27	1/8 x 3/4	2.35	65.00
94	18 and 20	2½	32	5/8 x 1/8	3.60	92.00
95	22 and 24	2¾	37	3/4 x 1	5.30	120.00

WILLIAMS "AGRIPPA" BORING-TOOL HOLDERS

FOR MULTIPLE BARS

"THE HOLDERS THAT HOLD"



SLEEVE BAR—FIG. 590

With this Holder, encumbering Sleeves or Bushings are unnecessary for interchangeable bars. Commercial forms of bar steel are adaptable for either bars or cutters without machining.

The Sleeve-bar fastening provides for the rapid adjustment of either straight or angular Cutters without the use of extra parts; it has greater strength than others of the same general design. Plain Bar provides for use with either Straight or Angular Cutters in the simplest manner possible, and is furnished with Headless Set Screws.

Unless otherwise specified standard size Sleeve-bar will be furnished.



PLAIN BAR—FIG. 591

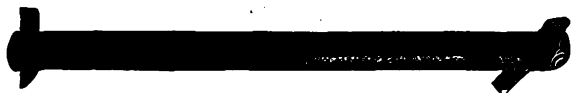
Furnished with either Plain or Sleeve Bar, 1 each 45° and 90° Cutter and Hardened Wrenches.

No.	Holder, Size	Holder Capacity for Bars, Size	Standard Bar, Size	Price	
				Complete Holder	
				With Plain Bar High Speed Cutters	With Sleeve Bar High Speed Cutters
080.	1/8 x 3/4	1/8 to 1/2	1/2	\$2.90	\$3.25
80	3/8 x 7/8	1/4 to 5/8	5/8	3.05	3.45
81	1/2 x 1 1/8	1/4 to 3/4	3/4	3.65	4.10
82	5/8 x 1 3/8	3/8 to 1 1/8	1 1/8	4.70	5.40
83	3/4 x 1 5/8	1/2 to 1 3/8	1 3/8	6.75	7.60

Bar and Cutter details on page 194.

WILLIAMS' "AGRIPPA" BORING-BARS AND CUTTERS

FOR BORING-TOOL HOLDERS AND ADJUSTABLE BORING-TOOL POSTS



SLEEVE BAR—FIG. 3975



PLAIN BAR—FIG. 3976

The Sleeve-bar fastening provides for the rapid adjustment of either straight or angular Cutters without the use of extra parts; it has greater strength than others of the same general design. The Plain Bar provides for use with either straight or angular Cutters in the simplest manner possible, and is furnished with Headless Set Screws.

Furnished with two Cutters and Hardened Wrench.

"Agrappa" Boring Bars Approximate Size		For Use with Holder No.	Posts No.	Cutters		Price		
Plain	Sleeve			Size	For Use at Ang- les of	Cutters Only	Complete Bar	
						High Speed	Plain High Speed Cutters	Sleeve High Speed Cutters
$\frac{1}{2} \times 8 \frac{1}{2}$	$\frac{1}{2} \times 7 \frac{1}{2}$	080-83	2-3	$\frac{1}{2} \times 1$	90°	\$0.10	\$1.30	\$1.65
				$\frac{1}{2} \times 1 \frac{1}{2}$	45°	.12		
$\frac{3}{4} \times 10 \frac{1}{2}$	$\frac{3}{4} \times 9 \frac{1}{2}$	80-83	2-4	$\frac{1}{2} \times 1$	90°	.10	1.40	1.80
				$\frac{1}{2} \times 1 \frac{1}{2}$	45°	.12		
$\frac{1}{2} \times 12 \frac{1}{2}$	$\frac{3}{4} \times 11$	81-83	2-5	$\frac{1}{2} \times 1 \frac{1}{2}$	90°	.15	1.80	2.25
				$\frac{1}{2} \times 2$	45°	.19		
$\frac{1}{2} \times 14 \frac{1}{2}$	$\frac{1}{2} \times 13 \frac{1}{2}$	82-83	2-5	$\frac{1}{2} \times 1 \frac{1}{2}$	90°	.24	2.60	3.30
				$\frac{1}{2} \times 2 \frac{1}{2}$	45°	.32		
$1 \frac{1}{2} \times 16 \frac{1}{2}$	$1 \frac{1}{2} \times 16$	83	2-5	$\frac{1}{2} \times 1 \frac{1}{2}$	90°	.35	3.75	4.60
				$\frac{1}{2} \times 3$	45°	.55		
$1 \frac{1}{2} \times 20$	$1 \frac{1}{2} \times 19$		2-5	$\frac{1}{2} \times 2 \frac{1}{2}$	90°	.40	5.75	6.25
				$\frac{1}{2} \times 3 \frac{1}{2}$	45°	.60		
$1 \frac{1}{2} \times 23 \frac{1}{2}$	$1 \frac{1}{2} \times 23 \frac{1}{2}$		3-5	$\frac{1}{2} \times 2 \frac{1}{2}$	90°	.60	8.00	8.50
				$\frac{1}{2} \times 3 \frac{1}{2}$	45°	.85		
$1 \frac{1}{2} \times 28$	$1 \frac{1}{2} \times 27 \frac{1}{2}$		4-5	$\frac{1}{2} \times 3 \frac{1}{2}$	90°	.90	10.75	11.75
				$\frac{1}{2} \times 4$	45°	1.30		
$2 \frac{1}{2} \times 34$	$2 \frac{1}{2} \times 33$		5	$\frac{1}{2} \times 3 \frac{1}{2}$	90°	1.70	14.50	16.25
				$\frac{1}{2} \times 4 \frac{1}{2}$	45°	2.35		

WILLIAMS' "AGRIPPA" ADJUSTABLE BORING-TOOL POSTS

FOR MULTIPLE BARS

Each Post accommodates a wide range of Bars; commercial sizes of bar steel are adaptable for either Bars or Cutters without machining.

The height of the Bar is easily and quickly adjusted—a turn of the Knurled Ring will raise or lower the base on which the Bar rests; tightening the Set Screw in the head of the Post then locks the whole device instantly, giving an extremely rigid tool. If Post is desired **without** the Bar, deduct price shown above.

Furnished with either Sleeve or Plain Bar, 1 each 45° and 90° Cutter and Hardened Wrenches.

Unless otherwise specified Standard size Sleeve Bar will be furnished.

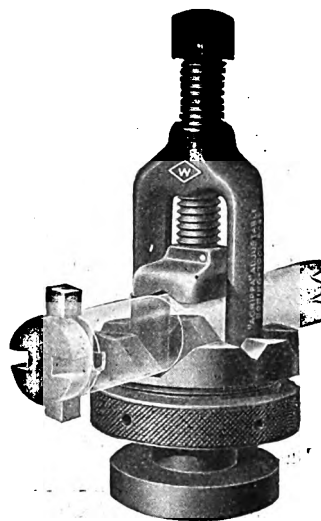


FIG. 3977

Number.....	2	3	4	5
Post—Length over all, without Screw.....	6 $\frac{5}{8}$	7 $\frac{5}{8}$	9 $\frac{1}{8}$	11 $\frac{1}{8}$
"T" Slot Flange:				
Diameter.....	3	3 $\frac{1}{2}$	4 $\frac{1}{4}$	5
Thickness.....	$\frac{5}{8}$	$\frac{3}{4}$	$\frac{7}{8}$	1 $\frac{1}{8}$
"T" Slot Neck:				
Diameter.....	1 $\frac{5}{8}$	1 $\frac{3}{4}$	2	2 $\frac{1}{4}$
Length.....	$\frac{3}{4}$	$\frac{1}{2}$	1	1 $\frac{1}{4}$
Post Capacity for Bars—				
Size.....	$\frac{1}{2}$ to 1 $\frac{1}{8}$	$\frac{1}{2}$ to 1 $\frac{1}{2}$	$\frac{5}{8}$ to 1 $\frac{1}{2}$	$\frac{3}{4}$ to 2 $\frac{1}{4}$
Standard Bar—Size.....	1 $\frac{1}{8}$	1 $\frac{1}{2}$	1 $\frac{1}{2}$	2 $\frac{1}{4}$
Price—Complete Post:				
With Sleeve Bar, High Speed Cutters.....	\$16.50	\$21.75	\$29.00	\$41.25
With Plain Bar, High Speed Cutters.....	16.00	21.25	28.00	39.50

*The "T" Slot Flange and Neck are furnished large to allow for fitting to individual machines. For special finishing to special dimensions, an extra charge of \$1.00 net, each, will be made.

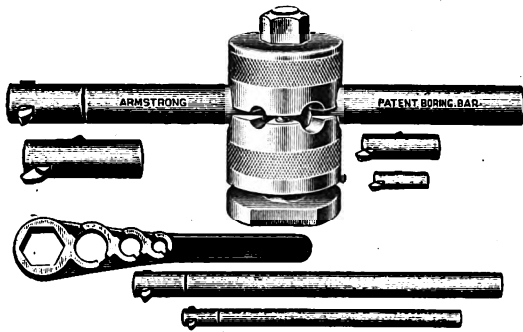
ARMSTRONG 3-BAR BORING TOOL

FIG. 594

Each Set is boxed separately and price includes Holder, three Armstrong Patent Boring Bars with straight and 45 deg. end caps, six High Speed Cutters and Armstrong Combination Wrench.

A slight turn of one nut releases or fastens both Bar and Holder.

Bars can be changed as needed almost instantly, thus allowing the operator to use the stiffest bar possible for each job with the result that speeds and feeds can be increased and time saved.

No. of Tool	1-B	2-B	3-B	4-B
Price complete	\$15.00	\$20.00	\$35.00	\$50.00
Diameter Bars, In.	$\frac{1}{2}, \frac{3}{4} & 1\frac{1}{8}$	$\frac{1}{2}, 1\frac{1}{8} & 1\frac{1}{4}$	$\frac{3}{4}, 1\frac{1}{8} & 1\frac{1}{2}$	$1\frac{1}{8}, 1\frac{1}{4} & 1\frac{1}{2}$
Length of Bars, In.	8, 11 & 16	9, 13 & 18	11, 16 & 21	13, 18 & 24
Size of Cutters, In. Sq.	$\frac{1}{16}, \frac{1}{8} & \frac{3}{16}$	$\frac{1}{16}, \frac{1}{8} & \frac{1}{4}$	$\frac{1}{8}, \frac{3}{16} & \frac{1}{2}$	$\frac{1}{8}, \frac{1}{4} & \frac{3}{8}$
For Lathes Swinging	14 to 16 in.	16 to 18 in.	20 to 22 in.	24 to 32 in.
Weight, complete Set	18 Pounds	27 Pounds	50 Pounds	75 Pounds

EXTRA CUTTERS—GROUND FOR BORING

Size, In. Sq.	$\frac{3}{16}$	$\frac{1}{4}$	$\frac{5}{16}$	$\frac{3}{8}$	$\frac{7}{16}$	$\frac{1}{2}$	$\frac{5}{8}$
Price Ea. . . .	\$0.25	\$0.30	\$0.45	\$0.65	\$0.90	\$1.20	\$2.00

Note—Bolt Head and Bottom part of Holder are made of ample size to allow for fitting, which is necessary on account of the great variation in height of centers above slide rest and difference in sizes of T slots. Fitting—An extra charge will be made for tools ordered fitted to special dimensions.

ARMSTRONG ADJUSTABLE BORING TOOL

This tool combines Convenience, Adjustability and Rigidity to a remarkable degree and is well adapted to a very wide range of work. The Holder is easily adjustable to different heights and will hold bars of various diameters. The Bars are made from high carbon steel seamless tubing of heavy gauge and are extremely stiff. The Cutter can be adjusted and solidly fixed at various angles for Boring, Facing or Turning.

Each Tool is boxed separately and price includes Holder, one Bar, two High Speed Cutters and Wrench.

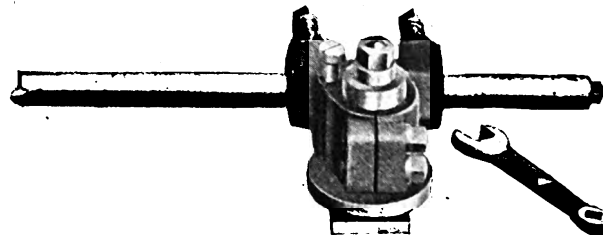


FIG. 594½

No.	Capacity of Holder Diameter Bars Inches	Size Bar Furnished Inches	Size Cutter Inch Square	For Lathes Swinging Inches	Weight Each Pounds	Extra Cutters Each	Price Each Complete
212	$\frac{1}{4}$ to $1\frac{1}{8}$	$1\frac{1}{8} \times 21$	$\frac{3}{8}$	14 to 18	25	\$0.65	\$18.00
213	$\frac{3}{8}$ to $1\frac{1}{2}$	$1\frac{1}{2} \times 24$	$\frac{1}{2}$	16 to 20	38	.90	25.00
214	$\frac{1}{2}$ to $1\frac{3}{4}$	$1\frac{3}{4} \times 28$	$\frac{5}{8}$	18 to 24	75	1.20	40.00
215	$\frac{5}{8}$ to $2\frac{1}{4}$	$2\frac{1}{4} \times 36$	$\frac{3}{4}$	20 to 36	120	2.00	60.00

NOTE—Bolt Head is made large enough to allow for fitting to T slots of various sizes.

FITTING—An extra charge of \$1.00 net will be made for fitting Bolt Head to special dimensions.

PRICE LIST—EXTRA BARS

Price includes one Bar of size specified, two High Speed Cutters and Wrench.

Size of Bar	Size Cutter Inch Square	Weight Each Pounds	Extra Cutters Each	Price Each
$\frac{3}{4}$ In. Diam.	14 In. Long	$\frac{1}{8}$	\$0.25	\$3.25
$1\frac{1}{8}$ " "	16 " "	$\frac{1}{4}$	.30	4.00
$1\frac{1}{2}$ " "	18 " "	$\frac{3}{8}$	.45	5.50
$1\frac{3}{4}$ " "	21 " "	$\frac{1}{2}$	.65	7.50
2 " "	24 " "	$\frac{5}{8}$	.90	10.00
$2\frac{1}{4}$ " "	28 " "	$\frac{3}{4}$	1.20	15.00
	36 " "	$\frac{7}{8}$	2.00	28.00

ARMSTRONG BORING TOOL HOLDER

FOR SMALL, LIGHT BORING, THREADING, ETC.

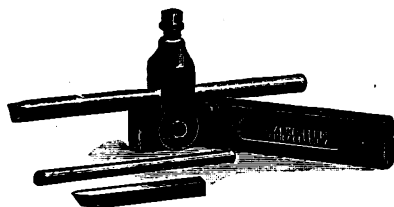


FIG. 595

This tool will be found very handy in the Tool Room or in Boring work of small internal diameter, Threading, Brass turning, etc. The boring Bars furnished are made from the best tool steel properly hardened, tempered and ground ready for use. The Holder is reversible, and can be used for turning either right or left hand.

PRICE LIST

Price includes Holder, Wrench, Two Boring Bars and One High Speed Cutter.

No.	Shank Inches	Size of Bar Furnished Diam. Inches	Size of Square Cutter Inches	Extra Square Cutters Each	Price Each Complete
15	$\frac{3}{8} \times \frac{3}{4}$	$\frac{1}{8}$ and $\frac{1}{4}$	$\frac{1}{4}$	\$0.30	\$2.75
16	$\frac{1}{2} \times 1$	$\frac{1}{8}$ and $\frac{1}{4}$	$\frac{1}{4}$	.45	3.50
17	$\frac{5}{8} \times 1\frac{1}{4}$	$\frac{1}{4}$ and $\frac{3}{8}$	$\frac{3}{8}$	.65	4.50
18	$\frac{3}{4} \times 1\frac{1}{2}$	$\frac{1}{4}$ and $\frac{3}{8}$	$\frac{1}{2}$	1.00	5.75

PRICE LIST OF EXTRA BORING BARS

Diameter.....	$\frac{1}{8}$ in.	$\frac{1}{4}$ in.	$\frac{1}{2}$ in.	$\frac{3}{4}$ in.	$\frac{1}{2}$ in.	$\frac{1}{4}$ in.
Length.....	4 in.	$4\frac{1}{2}$ in.	5 in.	6 in.	7 in.	8 in.
Price each.....	\$0.20	\$0.25	\$0.30	\$0.40	\$0.55	\$0.75

ARMSTRONG BORING TOOLS

PRICE LIST

Complete with Holder and Bar, straight and 45 deg. End Caps, Two High Speed Cutters and Double Head Wrench.

No.	Size Shank Inches	Diam. Bar Inch	Size Cutter Inch Sq.	Extra Cutters Each	Price Each Complete
00B	$\frac{1}{8} \times \frac{3}{4}$	$\frac{1}{2}$	$\frac{1}{8}$	\$0.25	\$ 3.25
8	$\frac{1}{8} \times \frac{1}{2}$	$\frac{1}{4}$	$\frac{1}{8}$	.25	3.25
9	$\frac{1}{2} \times 1\frac{1}{8}$	$\frac{1}{4}$	$\frac{1}{4}$	.30	3.85
10	$\frac{5}{8} \times 1\frac{1}{8}$	$\frac{1}{4}$	$\frac{1}{4}$	.45	5.10
11	$\frac{3}{4} \times 1\frac{1}{8}$	$1\frac{1}{8}$	$\frac{3}{8}$	.65	7.25
12	$\frac{7}{8} \times 1\frac{1}{4}$	$1\frac{1}{8}$	$\frac{1}{2}$	.90	10.75
13	1 x 2	$1\frac{1}{2}$	$\frac{1}{2}$	1.20	15.00



FIG. 592

The convenience and many practical advantages of this system of boring tools are known and appreciated in almost every modern machine shop.

The bar can be extended from the shank or holder to any desired length, giving the greatest degree of stiffness possible on every job.

The cutters are simply pieces of steel of stock size and shape, and as extra cutters of any desired form can be quickly ground, one of these tools, with a few pieces of steel for cutters, is equal in practical efficiency to a whole set of forged boring and inside threading tools.

FOR USE ON LATHES WITH CLAMP TOOL REST



FIG. 593

Complete with Holder and Bar, straight and 45 deg. End Caps, Two High Speed Cutters and Double Head Wrench.

In many cases it is very convenient and desirable to have a Boring Tool equipped with bars of different sizes. We are prepared to furnish extra bars with bushings to fit same to

No.	Size of Shank Inches	Diam. of Bar Inches	Length of Bar Inches	Size of Cutter Inch Sq.	Extra Cutters Each	Price Each Complete
108	$\frac{3}{4} \times \frac{1}{2}$	$\frac{1}{8}$	9	$\frac{1}{8}$	\$.25	\$ 2.75
109	1 x $1\frac{1}{8}$	$\frac{1}{4}$	11	$\frac{1}{4}$	.30	3.25
110	$1\frac{1}{4} \times 1\frac{1}{8}$	$\frac{1}{4}$	13	$\frac{1}{4}$	.45	4.35
111	$1\frac{1}{2} \times 1\frac{1}{8}$	$1\frac{1}{8}$	16	$\frac{3}{8}$	.65	6.25
112	$1\frac{3}{4} \times 1\frac{1}{8}$	$1\frac{1}{8}$	18	$\frac{1}{2}$	.90	9.00
113	2 x $2\frac{1}{8}$	$1\frac{1}{2}$	21	$\frac{1}{2}$	1.20	12.00
114	$2\frac{1}{4} \times 2\frac{1}{8}$	$1\frac{1}{4}$	24	$\frac{5}{8}$	2.00	18.00
115	$2\frac{1}{2} \times 2\frac{1}{8}$	$2\frac{1}{4}$	30	$\frac{3}{4}$	3.60	30.00

shanks of larger size. These extra bars to be of practical use must necessarily be equipped with wrench, caps, etc., making it a complete tool with exception of the shank.

BORING TOOLS, LESS SHANK

Price includes Bar with Straight and 45 deg. End Caps, Two High Speed Cutters, Wrench and Bushing. No bushing with Nos. 013, 014, 015.

Note—In ordering be careful to give size of shank (or number of tool) in which bar is to be used. When this information is not given no bushing will be included.

No.	Dimensions of Bar		Size of Cutter In. Sq.	With Bushing to Fit Shank Number	Extra Cutters Each	Price Each Complete
	Diam. Inches	Length Inches				
0B	$\frac{1}{2}$	8	$\frac{1}{8}$	8, 9 or 10	\$0.25	\$2.00
08	$\frac{1}{4}$	9	$\frac{1}{8}$	9, 10 or 11	.25	2.00
09	$\frac{1}{4}$	11	$\frac{1}{4}$	10, 11 or 12	.35	2.50
010	$\frac{1}{4}$	13	$\frac{1}{4}$	11, 12 or 13	.45	3.60
011	$1\frac{1}{8}$	16	$\frac{3}{8}$	12 or 13	.65	5.00
012	$1\frac{1}{8}$	18	$\frac{1}{2}$	13	.90	7.00
013	$1\frac{1}{2}$	21	$\frac{1}{2}$	None	1.20	9.00
014	$1\frac{1}{4}$	24	$\frac{5}{8}$	None	2.00	13.00
015	$2\frac{1}{4}$	30	$\frac{3}{4}$	None	3.60	23.00

P. & W. BORING AND INSIDE THREADING TOOL

NO. 711

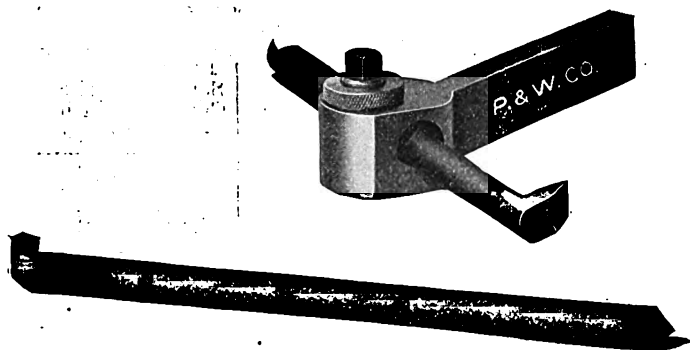


FIG. 258

Cutter-bars for inside threading are furnished for either U. S. Standard or sharp "V" threads, and may be ground many times without changing their shape. Size of shank, $\frac{1}{2}$ x 1 inch. Parts interchangeable. The holder is made of steel and the screws are thoroughly hardened. Cutters are made with a drill point, to be used as a starter; a twist drill may then be inserted in the holder; a hole drilled and finished to size with one of the cutter-bars, and, if required, threaded, without removing the holder from the tool-post.

In ordering cutter-bars for inside threading state pitch and form of thread and diameter of holes in which they are to be used.

PRICE LIST

Holder, with three cutters for boring.....	\$3.00
Cutter No. 1, $\frac{1}{8}$ -inch diameter, 8 inches long.	
For boring.....	.20
For inside threading.....	.50
Cutter No. 2, $\frac{1}{4}$ -inch diameter, 9 inches long.	
For boring.....	.30
For inside threading.....	.60
Cutter No. 3, $\frac{3}{8}$ -inch diameter, 10 inches long.	
For boring.....	.50
For inside threading.....	.80

P. & W. THREADING TOOL

SINGLE-POINT CUTTERS AND CHASERS

NO. 707

Chasers and single-point cutters of finer pitches than listed, made to order at special prices.

U. S. Standard chasers are made sharp at bottom of thread but are flattened on the top to correspond with the pitch to be cut.

SINGLE OFFSET CUTTERS, U. S. or V Form:

Carbon Steel, 4 to 32 threads per inch.....	\$0.50
High Speed Steel, 4 to 32 threads per inch.....	1.40

DOUBLE OFFSET CUTTERS, U. S. or V Form:

Carbon Steel, 4 to 32 threads per inch.....	1.00
High Speed Steel, 4 to 32 threads per inch.....	2.50

CENTER TURNING TOOL.....

1.00

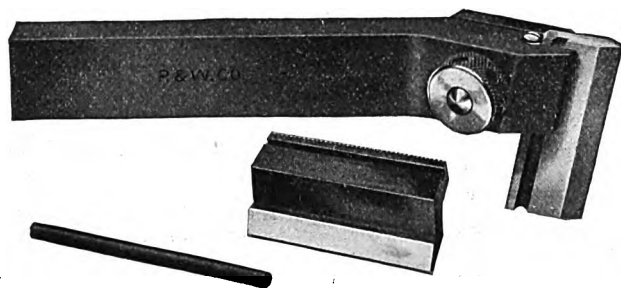


FIG. 256

Combines economy with all essential points in a thread-cutting and forming tool. Cutters have 15 degrees clearance from perpendicular which is ample for nearly all threads required. The same single point cutter is used for right and left-hand threading. Threads can be cut very close to a shoulder. To sharpen, simply grind off the top of the cutter.

Forming tools and special thread tools made to sample drawings or templates at special prices. All cutters will fit either Nos. 1, 2 or 3 holder.

The No. 2 holder made straight is carried in stock and will be furnished at regular list and discount.

PRICE LIST

No. 1 holder ($\frac{3}{4}$ x $\frac{3}{8}$ x $5\frac{1}{4}$), with one U. S. or V cutter; weight $10\frac{1}{2}$ ounces.....	\$2.75
No. 2 holder (1 x $\frac{1}{2}$ x 6), with one U. S. or V Cutter; weight 19 ounces.....	2.75
No. 3 holder ($1\frac{1}{2}$ x $\frac{5}{8}$ x $8\frac{1}{2}$), with one U. S. or V cutter; weight 2 pounds, 14 ounces.....	5.00
Strap bolt, weight $1\frac{3}{4}$ ounces.....	.50
Strap adjusting screw, weight $\frac{1}{4}$ ounce.....	.12
Spring adjusting screw, weight $\frac{1}{4}$ ounce.....	.08
Nut, weight $\frac{3}{4}$ ounce.....	.15
Clamp pin, weight $\frac{1}{2}$ ounce.....	.03

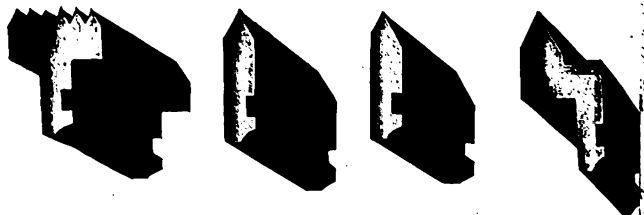


FIG. 262

Threads per Inch	Single-Point Cutters Price, Each				Chasers Price, Each	
	Carbon Steel U. S. or V.	High Speed Steel U. S. or V.	Carbon Steel Whitworth	High Speed Steel Whitworth	Carbon Steel U. S. or V.	Carbon Steel Whitworth
3, 3 $\frac{1}{4}$, 3 $\frac{1}{2}$	\$1.00	\$2.80	**	**	**	**
4	.50	1.40	**	**	\$1.20	**
4 $\frac{1}{2}$, 5	.50	1.40	\$1.00	\$2.80	1.20	\$1.75
5 $\frac{1}{2}$	.50	1.40	**	**	1.20	**
6, 7, 8	.50	1.40	1.00	2.80	1.00	1.75
9, 10, 11	.50	1.40	1.00	2.80	.90	1.75
11 $\frac{1}{2}$	.50	1.40	**	**	.90	**
12	.50	1.40	1.00	2.80	.90	1.50
13	.50	1.40	**	**	.90	**
14, 16, 18, 20	.50	1.40	1.00	2.80	.90	1.35
24, 28, 32	.50	1.40	**	**	.90	**

* *Prices on application.

WILLIAMS "AGRIPPA" THREADING-TOOL HOLDERS

WITH LOCKABLE-SPRING HEAD
"THE HOLDERS THAT HOLD"

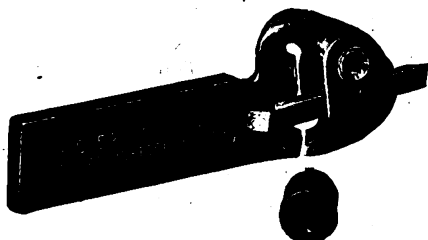


FIG. 596

Furnished with Headless Cam, Lock Nut, Alloy Steel Cutter and Hardened Wrench.

A highly perfected tool for fine or coarse threading or other Lathe work.

The nut for the Lockable-Spring Head provides for the perfectly rigid backing required for coarse threading and heavy

cuts; when it is loosened the Holder becomes a spring-tool for finishing work. It is equally efficient as a Turning-tool Holder, for which purpose the High Speed Cutters furnished with the Turning-tool Holders can be supplied.

The Cam-fastening is always rapid and positive—the greater the pressure the tighter the lock. It offers full freedom for operation without removal from tool post and opposes no obstruction to cutting facilities. Extra Cams can be furnished at a slight charge.

The Cutter, made from highest grade of Alloy Steel, is ground all over to special size, the point forming an angle of 60%.

Number	Holder, Size	Cutter Size Square	Price	
			Ground Cutter, Alloy Steel	Complete Tool
50	$\frac{3}{8} \times \frac{7}{8}$	$\frac{1}{4}$	\$0.45	\$2.25
51	$\frac{1}{2} \times 1\frac{1}{8}$	$\frac{1}{2}$	.55	2.75
52	$\frac{3}{4} \times 1\frac{3}{4}$	$\frac{3}{8}$	.70	3.50

ARMSTRONG THREADING TOOLS

No.	Size of Holder Inches	Weight Each Pounds	Price Each Complete	
			With Carbon Steel Cutter	With High Speed Cutter
00T	$\frac{1}{4} \times \frac{3}{4} \times 5$	$\frac{3}{4}$	\$2.25	\$2.75
51	$\frac{3}{8} \times \frac{1}{2} \times 6$	$\frac{1}{2}$	2.25	2.75
52	$\frac{1}{2} \times 1\frac{1}{8} \times 6$	$1\frac{1}{2}$	2.75	3.35
53	$\frac{5}{8} \times 1\frac{1}{2} \times 7$	$2\frac{1}{4}$	3.50	4.25
54	$\frac{3}{4} \times 1\frac{5}{8} \times 8$	$3\frac{1}{2}$	4.50	5.50
55	$\frac{1}{2} \times 1\frac{3}{4} \times 9$	$4\frac{1}{2}$	5.50	6.50
	1 x2 x10	$6\frac{1}{4}$	7.00	8.25

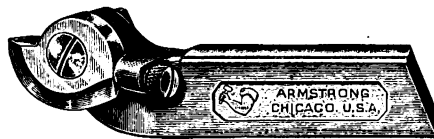


FIG. 597

Each tool is boxed separately and price includes wrench and a single point cutter, V, U. S. or Whitworth Standard.

A Threading Tool is essentially a forming tool and any error or inaccuracy of shape or angle in the tool point will surely be reproduced in the thread and must result in poorly fitted work.

The cutters used in the Armstrong Threading Tool require grinding on the top edge only, to sharpen, and therefore always remain true to form and of correct angle; its use thus insures perfect fitting threads, and saves much grinding, as well as dispensing entirely with forging and tempering. The cutters are backed off to afford proper clearance. The back of cutter is eccentric in form and bears upon a hardened stop screw. This arrangement allows of positive and accurate adjustment.

CUTTERS FOR ARMSTRONG THREADING TOOLS

Grind Cutter on a line from point to center, being careful to adjust it so that cutting edge is in a horizontal line, A to A.

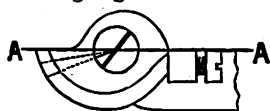


FIG. 598

LIST OF CUTTERS FURNISHED

No.	Single Point Cutters
00T and 50	All standard pitches, 6 to 20, inclusive.
51	All standard pitches, 5 to 20, inclusive.
52	All standard pitches, 4 to 20, inclusive.
53, 54 and 55	All standard pitches, 3 to 20, inclusive.
No.	Chaser Cutters
00T and 50	14, 16, 18, 20, 24*.
51	1 $\frac{1}{2}$ *, 12, 13†, 14, 16, 18, 20, 24*.
52	8, 9, 10, 11, 11 $\frac{1}{2}$ *, 12, 13†, 14, 16, 18, 20.
53 and 54	8, 9, 10, 11, 11 $\frac{1}{2}$ *, 12, 13†, 14, 16, 18, 20.

*V Thread only. †Not made in Whitworth.

Note—When ordering cutters or chasers (except single point V cutters) it is necessary to specify exact pitch or number of threads per inch. When High Speed is not specified in order Carbon Steel Cutters will be shipped.

PRICE LIST OF CUTTERS CARBON CUTTERS

Sharp V, U. S. Standard or Whitworth Standard

00T and 50		51		52		53 and 54		55
Single Point	Chaser	Single Point	Chaser	Single Point	Chaser	Single Point	Chaser	Single Point Only
\$0.75	\$1.25	\$0.90	\$1.40	\$1.15	\$1.65	\$1.40	\$1.80	\$1.95

HIGH SPEED CUTTERS

Sharp V, U. S. Standard or Whitworth Standard

00T and 50		51		52		53 and 54		55
Single Point	Chaser	Single Point	Chaser	Single Point	Chaser	Single Point	Chaser	Single Point Only
\$1.50	\$2.50	\$1.80	\$2.80	\$2.30	\$3.30	\$2.80	\$3.60	\$3.90

INSIDE AND OUTSIDE HAND CHASERS

INSIDE: NO. 723

OUTSIDE: NO. 725

SIZES AND PRICES

No. of Threads Per Inch to be Cut	Price Each		No. of Threads to the Inch to be Cut	Price Each	
	U. S. or V. Thread	Whitworth Thread		U. S. or V. Thread	Whitworth Thread
3	\$0.50	\$0.50	11½	\$0.35	**
3¼	.50	.50	12	.35	\$0.35
3½	.50	.50	13	.35	**
4	.50	.50	14	.35	.35
4½	.50	.50	16	.35	.35
5	.50	.50	18	.35	.35
5½	.50	**	19	**	.35
6	.50	.50	20	.35	.35
7	.50	.50	22	**	.35
8	.50	.50	24	.35	.35
9	.35	.35	26	**	.35
10	.35	.35	27	.35	**
11	.35	.35	28	.35	**
			32	.35	.35

* *Prices on application.

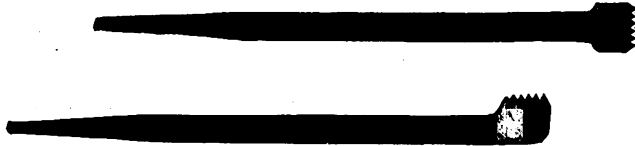


FIG. 257

Hand chasers having pitches other than listed will be furnished at special prices.

LATHE TOOLS

Two grades of tools—carbon steel tools for all ordinary purposes, made of a special analysis crucible tool steel, and high-speed tools for the severest kind of work, made of the highest grade of high-speed steel.

The Lathe Tools are made in twenty different styles, assembled in sets of ten, twelve, sixteen and twenty tools.

If full sets are not wanted, selections can be made of any particular styles.

SET OF 20 LATHE TOOLS

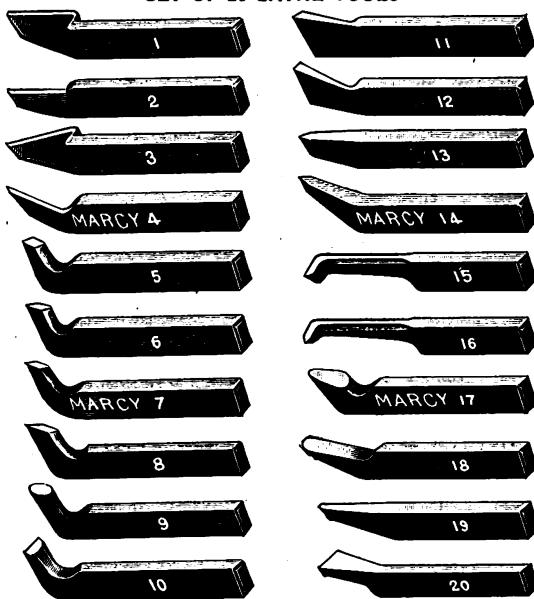


FIG. 608

Both grades are hammer forged at the proper heat, each tool shaped to a standard size by gauges and templets, tempered by a special process, and ground ready for use, the product of an up-to-date plant and twelve years' experience in working tool steel.

Special sizes and shapes of these tools made to order.

1. Left-Hand Side Tool.
2. Right-Hand Side Tool.
3. Left-Hand Bent Side Tool.
4. Right-Hand Bent Side Tool.
5. Left-Hand Diamond Point.
6. Right-Hand Diamond Point.
7. Bent Right-Hand Diamond Point.
8. Half Diamond Point, R. H.
9. Round Nose.
10. Water Finishing Tool.
11. Straight Cutting-Off Tool.
12. Bent Cutting-Off Tool.
13. Straight Thread Tool.
14. Bent Thread Tool.
15. Inside Turning Tool.
16. Inside Thread Tool.
17. Bull Nose Tool.
18. Finishing or Necking Tool.
19. Scaling or Roughing Tool.
20. For Truing up Centers, etc.

Set of 16 contains Nos. 1, 2, 3 4, 5, 6, 7, 8, 9, 10, 11, 13, 14, 15, 16 and 19.

Set of 12 contains Nos. 1, 2, 4, 5, 6, 9, 11, 13, 14, 15, 16 and 19.

Set of 10 contains Nos. 1, 2, 5, 6, 9, 11, 13, 15, 16 and 19.

PRICE LIST OF CARBON STEEL TOOLS

Length	Sets of	8	10	12	16	20
1¼x½—Per set,						
1½x½	"					
1¾x½	"					
2x½	"					
2½x½	"					
3x½	"					
3½x½	"					
4x½	"					
4½x½	"					
5x½	"					
5½x½	"					
6x½	"					
6½x½	"					
7x½	"					
7½x½	"					
8x½	"					
8½x½	"					
9x½	"					
9½x½	"					
10x½	"					
10½x½	"					
11x½	"					
11½x½	"					
12x½	"					

Prices upon application

PRICE LIST OF HIGH SPEED TOOLS

¾x¾
1x1
1½x1¼

Prices upon application

5/8x1½
¾x1½
1x2

Prices upon application

WILLIAMS "AGRIPPA" LATHE TOOL SET

"THE HOLDERS THAT HOLD"

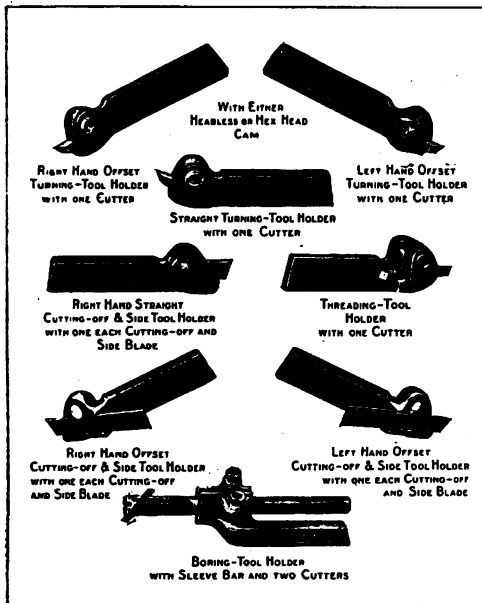


FIG. 607

An "always ready" set of eight "Agrippa" Tool Holders, which in minimum number of tools will provide for widest limit of economy and service in lathe work.

Threading-tool Cutters are made from the highest class of alloy steel. All others from High Speed Steel. The Boring-tool Holder will be furnished with the Sleeve Bar, or should Plain Bar be specified, at proportionate reduction in cost.

Unless otherwise specified Holders with Hex Head Cams will be furnished.

Set No.	Holder, Size	For Lathes of Approximate Swing Inches	PRICE, COMPLETE SET
			With High Speed Cutters
†00	$\frac{1}{2} \times \frac{3}{4}$	7 to 10	\$16.15
0	$\frac{3}{8} \times \frac{1}{2}$	10 to 12	20.10
1	$\frac{1}{2} \times 1\frac{1}{8}$	14 to 16	24.70
2	$\frac{5}{8} \times 1\frac{3}{8}$	16 to 18	32.90
†3	$\frac{3}{4} \times 1\frac{5}{8}$	18 to 20	40.60
*†4	$\frac{7}{8} \times 1\frac{3}{4}$	24 to 36	43.80

†Sets No. 00, 3 and 4 furnished without the threading-tool Holder.

*No. 4 Set furnished without the Boring-tool Holder.

ARMSTRONG LATHE TOOL SETS

"BIG TEN" TOOL HOLDER SET

This set includes the ten tools shown opposite and is so complete as to cover the entire range of lathe work and to render entirely unnecessary the forging of tools with the attendant waste of time and material. Each Holder is equipped with Wrench and one High Speed Cutter.

Set No.	Size of Tool Shanks Inches	For Lathes (See Note)	Weight of set Lbs.	Price Set of Ten
00	$\frac{1}{2} \times \frac{3}{4}$	7 to 10 In. Swing	6½	\$20.90
0	$\frac{3}{8} \times \frac{1}{2}$	10 to 12 In. "	8½	22.20
1	$\frac{1}{2} \times 1\frac{1}{8}$	14 to 16 In. "	17	26.65
2	$\frac{5}{8} \times 1\frac{3}{8}$	16 to 18 In. "	27	34.45
3	$\frac{3}{4} \times 1\frac{5}{8}$	18 to 20 In. "	43	46.00
4	$\frac{7}{8} \times 1\frac{3}{4}$	24 to 36 In. "	62	60.25
5	1 x 2	36 to 48 In. "	91	79.25

"HANDY FIVE" TOOL HOLDER SET

This set includes the Five Lathe Tools which are constantly used on ordinary work—

Straight Shank Turning Tool.

Boring Tool.

Threading Tool.

Right Hand Off-set Cutting-off Tool.

Right Hand Off-Set Side Tool.

Each Holder is equipped with Wrench and one High Speed Cutter.

Set No.	Size of Tool Shanks Inches	For Lathes (See Note)	Weight of Set Pounds	Price Set of 5
00-F	$\frac{1}{2} \times \frac{3}{4}$	7 to 10 In. Swing	4	\$11.60
0-F	$\frac{3}{8} \times \frac{1}{2}$	10 to 12 In. "	5	12.15
1-F	$\frac{1}{2} \times 1\frac{1}{8}$	14 to 16 In. "	9½	14.65
2-F	$\frac{5}{8} \times 1\frac{3}{8}$	16 to 18 In. "	16	19.00
3-F	$\frac{3}{4} \times 1\frac{5}{8}$	18 to 20 In. "	25	25.60
4-F	$\frac{7}{8} \times 1\frac{3}{4}$	24 to 36 In. "	37	33.95
5-F	1 x 2	36 to 48 In. "	53	44.75

Note—As there is a wide variation in the proportions of Lathes of different manufacture, it is only possible to give approximate size or swing of Lathes adapted to the use of tools of different sizes. Tool posts should be carefully measured before ordering tools.

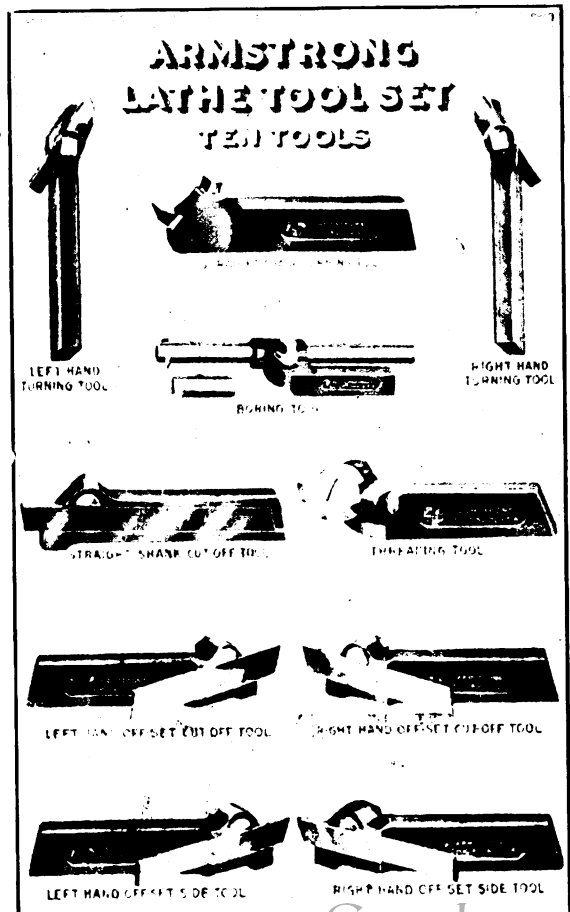


FIG. 607 ½

WILLIAMS "AGRIPPA" KNURLING TOOL HOLDER

WITH UNIVERSAL REVOLVING HEAD

"THE HOLDERS THAT HOLD"



FIG. 600

COARSE, MEDIUM, FINE, HALF-SIZE KNURLING CORRUGATIONS



FIG. 601

A suitable companion of sturdiness for service in the "Agrippa" Tool Holder line.

The Knurls, fitted in a revolving head, provide for coarse, medium and fine work, and a minimum of time losses common in changing them. Like the pins or axles, they are made from hardened and tempered Crucible Tool Steel. Furnished with three pairs of Knurls as illustrated.

Number	Holder, Size	Standard Knurls Size	PRICE	
			Extra Knurls Pair	Complete Holder
11-K	$\frac{1}{2} \times 1\frac{1}{8} \times 6\frac{3}{8}$	$\frac{1}{16} \times \frac{3}{4}$	\$0.75	\$6.00

ARMSTRONG KNURLING TOOLS

This Tool is self centering and the knuckle or joint has ample bearing to resist the severe strains of both end and side thrust. In these essentials the Armstrong Knurling Tool is unexcelled. The knurls and pins are accurately made of Tool Steel suitably tempered. All other parts are Drop Forged or Bar Steel, hardened. Each Tool is boxed separately

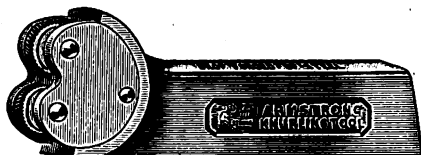


FIG. 602

No.	Size of Holder	Weight Pounds	Extra Knurls Pair	Price Each Comp.
00K	$\frac{1}{8} \times \frac{3}{4} \times 4\frac{1}{2}$	$\frac{1}{2}$	\$0.65	\$3.75
OK	$\frac{3}{8} \times \frac{1}{2} \times 5$	$\frac{3}{4}$	.65	4.00
1K	$\frac{1}{2} \times 1\frac{1}{8} \times 6\frac{1}{2}$	$1\frac{1}{2}$	.75	4.50
2K	$\frac{5}{8} \times 1\frac{3}{8} \times 7$	$2\frac{1}{4}$	.75	6.00

WITH REVOLVING HEAD

The advantages of this tool are apparent at a glance. The revolving head is fitted with three pairs of knurls, fine, medium and coarse, either of which can be used without the inconvenience and loss of time incident to changing knurls

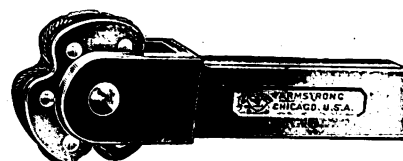
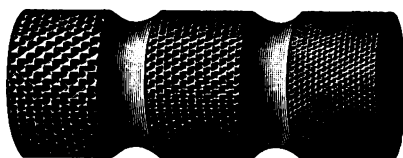


FIG. 603

No.	Size Inches	Weight Each Pounds	Extra Knurls Per Pair	Price Complete
3-K	$\frac{1}{2} \times 1\frac{1}{8} \times 6\frac{1}{2}$	2	\$0.75	\$6.00



COARSE MEDIUM FINE

FIG. 604

Illustration shows full size Diamond Knurling.

NOTE—Knurls can be furnished coarse, medium and fine in either straight line or Diamond pattern. Medium Diamond Knurls will be sent with tool when not otherwise specified

Standard width of Knurl face is $\frac{1}{4}$ in., but Knurls with full width face ($\frac{3}{8}$ in.) will be furnished at regular price when required and so specified.

REX "AA" HARDENED HIGH SPEED STEEL FOR TOOL HOLDERS



FIG. 2022

We supply High Speed Steel in squares up to 1-inch inclusive, hardened in the bar, ready for use in Tool Holders or otherwise.

A complete stock of small squares, single and double bevels, in three foot lengths hardened ready for use is carried in stock.

It is not necessary to heat this steel, but it can be nicked on a sharp emery wheel, broken off to length desired, and then ground to the required cutting shape.

Price per pound..... \$....

TOOL HOLDER LENGTHS

The ordinary standard sizes and lengths of Hardened High Speed Steel for Tool Holders are as follows:

Inch Square	Length Inches	Price per Pound
$\frac{1}{4}$	$2\frac{1}{2}$	....
$\frac{3}{8}$	$2\frac{1}{2}$	....
$\frac{1}{2}$	3	....
$\frac{3}{4}$	$3\frac{1}{2}$	....
$\frac{1}{2}$	4	....
$\frac{3}{4}$	4	....
$\frac{1}{2}$	$4\frac{1}{2}$	....
$\frac{3}{4}$	$4\frac{1}{2}$	....

The above lengths (with 30 degree bevel) will be furnished, unless otherwise specified.

We carry the above standard sizes, Hardened Ready for Use, adaptable to all the standard makes of Tool Holders.

HIGH SPEED HARDENED BEVELS FOR CUTTING OFF TOOLS


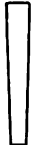

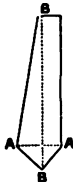
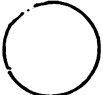
This steel is beveled about $\frac{1}{8}$ inch on each side for clearance.
Sizes Carried in Stock

Inch.	Price per Pound
$\frac{5}{8} \times \frac{3}{4}$	\$....
$\frac{3}{4} \times \frac{1}{8}$
1 x $\frac{1}{8}$
$\frac{7}{8} \times \frac{1}{8}$
$1\frac{3}{8} \times \frac{1}{4}$
$1\frac{1}{8} \times \frac{1}{8}$
$1\frac{1}{4} \times \frac{1}{4}$

ARMSTRONG SPECIAL SELF-HARDENING TOOL HOLDER STEEL

IN 3-FOOT BARS

READY TO USE—NO TREATMENT REQUIRED

SQUARES		Size Inches	Price Per 3-Ft. Bar	Size Inches	Price Per 3-Ft. Bar	BEVEL		Size of Steel—Inches	Price Per 3-Ft. Bar
									
FIG. 3978 For use in Arm- strong Turning and Boring Tools		$\frac{1}{8}$ $\frac{1}{4}$ $\frac{3}{8}$ $\frac{1}{2}$	\$1.20 2.00 3.00 4.25 5.60 7.10	$\frac{5}{8}$ $\frac{3}{4}$ $\frac{7}{8}$ 1 $1\frac{1}{8}$	\$11.10 15.80 21.30 28.20 34.35	FIG. 3981 For use in Armstrong Cutting- off Tools		$\frac{5}{8} \times \frac{1}{2}$ $\frac{1}{2} \times \frac{5}{8}$ $\frac{1}{8} \times \frac{3}{4}$ $\frac{1}{8} \times \frac{7}{8}$ $\frac{1}{8} \times 1$ $\frac{1}{8} \times 1\frac{1}{8}$ $\frac{1}{4} \times 1\frac{1}{4}$ $\frac{1}{4} \times 1\frac{3}{8}$	\$2.40 2.40 3.55 3.75 6.00 6.60 9.25 9.60
FLATS						SPECIAL SHAPE		Size of Steel on lines AA and BB Inches	Price Per 3-ft. Bar
									
FIG. 3979 For use in Arm- strong Planer and Slotter Tools		$\frac{1}{4} \times \frac{3}{8}$ $\frac{1}{8} \times \frac{1}{2}$ $\frac{3}{8} \times \frac{1}{2}$ $\frac{1}{2} \times \frac{1}{2}$	\$3.10 4.25 5.85 8.15 10.35	$\frac{1}{2} \times \frac{3}{4}$ $\frac{5}{8} \times \frac{3}{4}$ $\frac{7}{8} \times \frac{3}{4}$ $\frac{3}{4} \times 1$ $\frac{7}{8} \times 1\frac{1}{8}$	\$11.00 12.00 15.60 20.65 27.30	FIG. 3982 For use in Armstrong Side Tools		$\frac{1}{8} \times \frac{1}{2}$ $\frac{1}{8} \times \frac{5}{8}$ $\frac{1}{8} \times \frac{3}{4}$ $\frac{1}{4} \times \frac{7}{8}$ $\frac{1}{8} \times 1$ $\frac{3}{8} \times 1\frac{1}{4}$ $\frac{1}{8} \times 1\frac{3}{8}$ $\frac{1}{2} \times 1\frac{1}{2}$	\$2.50 3.30 4.15 5.85 7.60 10.60 12.75 18.65
ROUNDS									
									
FIG. 3980 For use in Arm- strong Turning Tools		$\frac{1}{4}$ $\frac{3}{8}$ $\frac{1}{2}$	\$1.65 2.40 3.35	$\frac{7}{8}$ $1\frac{1}{2}$ $\frac{3}{8}$	\$4.45 5.65 8.80				

NOTE.—Steel for Side Tools and Cutting-Off Tools is rolled to approximate size, but requires grinding on edges to bring to exact size fitting Armstrong Cutting-Off and Side Tool Holders.

WILLIAMS "AGRIPPA" SPECIAL CUTTERS

FOR FORGED CUTTER-TOOL HOLDERS
"THE HOLDERS THAT HOLD"

Extra heavy in design, drop-forged from "Agrippa" High Speed Steel and hardened and ground ready for lathe use.

The full extent of their service and economy will be best appreciated by purchase in full-sets (one dozen lots) mounted on special carriers.



FIG. 609



FIG. 610



FIG. 611



FIG. 609 1/2

*Cutter Mark	Style of Cutter	For Holder No.				
		101	102	103	105	106
	Diameter of Cutter Shank	3/8	1/2	5/8	3/4	7/8
A L	Side, Left Hand	\$.95	\$1.50	\$2.10	\$3.85	\$5.10
A R	Side, Right Hand	.95	1.50	2.10	3.85	5.10
B L	Diamond Point, Left Hand	.95	1.50	2.10	3.85	5.10
B R	Diamond Point, Right Hand	.95	1.50	2.10	3.85	5.10
C L	Diamond Point, Left Hand Offset	.95	1.50	2.10	3.85	5.10
C R	Diamond Point, Right Hand Offset	.95	1.50	2.10	3.85	5.10
D L	Roughing, Left Hand	.95	1.50	2.10	3.85	5.10

*Cutter Mark	Style of Cutter	For Holder No.				
		101	102	103	105	106
	Diameter of Cutter Shank	3/8	1/2	5/8	3/4	7/8
D R	Roughing, Right Hand	\$.95	\$1.50	\$2.10	\$3.85	\$5.10
E R	Threading, Right Hand	1.15	1.80	2.50	4.50	5.70
E S	Threading, Straight	1.15	1.80	2.50	4.50	5.70
F	Flat Nose	1.15	1.80	2.50	4.50	5.70
G R	Cutting-off, Right Hand	1.15	1.80	2.50	4.50	5.70
H L	Hog Nose, Left Hand	.95	1.50	2.10	3.85	5.10
H R	Hog Nose, Right Hand	.95	1.50	2.10	3.85	5.10

*When cutters are ordered ground for use on Planer or Shaper the letter "O" will be added to the Cutter Mark for identification.

Complete Set of any 12 minimum price Cutters, mounted on Special Carriers.

WILLIAMS "AGRIPPA" TOOL HOLDER STEEL

IN CUTTER LENGTHS TO FIT "AGRIPPA" TOOL HOLDERS

Require minimum of grinding only, for use in Holders. All High Speed Steel Cutters are hardened.

FIG. 612

FOR TURNING-TOOL HOLDERS			
Number	Cutter, Size		Price Each
	Square	Length	High Speed
00 & 0200	3/16	1 7/8	\$.15
0 & 200	1/4	2 3/8	.22
1 & 201	5/16	2 1/2	.35
2 & 202	3/8	3 3/8	.60
3	7/16	3 3/4	.90
4 & 204	1/2	4 1/8	1.30
5	5/8	4 3/4	2.35
6	3/4	5 1/2	3.85

Cutters of above sizes are also adaptable for turning when used in Threading-tool Holder.

FOR "AGRIPPA" BORING BARS				
"Agrippa" Bar	For Use at Angle of	Cutter Size		Price Each
		Square	Length	High Speed
1/2	90°	3/16	1	\$0.10
	45°	1/8	1 1/2	.12
	90°	1/8	1	.10
5/8	45°	1/8	1 1/2	.12
	90°	1/4	1 1/4	.15
3/4	45°	1/4	2	.19
	90°	1/8	1 1/2	.24
1 1/8	45°	1/8	2 1/2	.32
	90°	3/8	1 7/8	.35
	45°	3/8	3	.55

FOR PLANING-TOOL HOLDERS

FIG. 613

Number	Cutter, Size		Price Each
	Rectangle	Length	High Speed
91	1/4 x 3/8	2 1/2	\$.35
92	1/8 x 1/2	3	.55
93	3/8 x 1/2	3 1/2	.80
94	1/2 x 3/4	4 1/4	1.95
95	5/8 x 1/2	5	3.35
96	3/4 x 1	6	5.25
97	7/8 x 1 1/8	7	8.20

FOR THREADING-TOOL HOLDERS

FIG. 614

Number	Cutter, Size		Price Each
	Square	Length	Alloy Steel Ground to Size
50	1/4	2 3/8	\$.45
51	5/16	2 7/8	.55
52	3/8	3 3/8	.70

Turning-tool Cutters *are adaptable for turning work in the Threading-tool Holder—see table, top of page.

Three feet lengths will be quoted upon as our supply permits.

FOR CUTTING-OFF TOOL HOLDERS



FIG. 615

Number	*Cutter Blade Size	Price Each	
		High Speed	
020 & 030	1/4 x 1/2 x 4 5/8	\$.60	
20 & 30	3/8 x 5/8 x 5 1/8	.65	
21 & 31	1/2 x 3/4 x 6 1/8	.90	
22 & 32	1/2 x 1/2 x 7	1.30	
23 & 33	1/2 x 1 x 8 1/4	2.15	
24 & 34	1/2 x 1 1/8 x 9 1/2	2.90	

*Cutter Blade, Size	Price Each	
	High Speed	
1/2 x 1/2 x 4 5/8	\$.60	
3/4 x 5/8 x 5 1/8	.90	
1/2 x 3/4 x 6 1/8	1.40	
1/2 x 1/2 x 7	2.30	
1/2 x 1 x 8 1/4	3.40	
3/8 x 1 1/8 x 9 1/2	5.00	

FOR SIDE-TOOL HOLDERS



FIG. 616

*Finish sizes given. They are furnished ground to size.

WEBER CRANK-PIN RE-TURNING TOOL

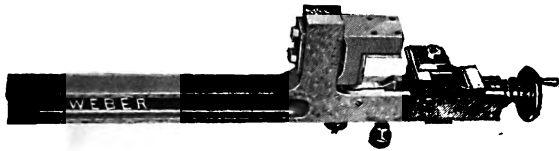


FIG. 3983

This is an attachment for lathes for truing up crank-pins. The shaft is held between centers on the lathe and all pins are turned and finished from one setting. The tool rides around with the pin, the handle resting at all times on the bed of the lathe. The cutting tool used is a forming tool, the width of the pin. Pins returned with this tool will be found accurate. They will also be found to be absolutely parallel with a line between centers of the lathe. This means they will be parallel to the main bearings.

Will take pins from $1\frac{1}{4}$ inch to 3 inches in diameter and $1\frac{1}{8}$ inch to 4 inches in diameter. Six cutting tools are furnished. These will fit the pins of most of the popular trucks and tractors. One extra blank tool is included, which can be cut to any desired length. Weight, 65 pounds.

Price complete in wooden case.....\$150.00

ARMSTRONG GRINDING HOLDERS

No.	Holds Cutters	Weight Each Pounds	Price each
1-G	$\frac{1}{8}$ inch and $\frac{1}{4}$ inch.....	1	\$0.30
2-G	$\frac{1}{8}$ inch and $\frac{3}{8}$ inch.....	$1\frac{1}{2}$	.35
3-G	$\frac{1}{8}$ inch and $\frac{1}{2}$ inch.....	$2\frac{1}{4}$	.45
4-G	$\frac{3}{8}$ inch and $\frac{3}{4}$ inch.....	$3\frac{1}{2}$	.60
5-G	$\frac{1}{2}$ inch, 1 inch and $1\frac{1}{8}$ inch.....	$5\frac{1}{2}$	.85

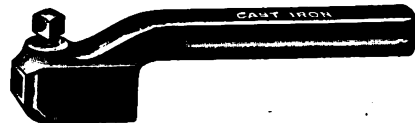


FIG. 599

Grinding Holders are convenient and inexpensive.

Tool Holders are frequently ruined by workmen holding cutters in them while grinding or sharpening and this wasteful practice can be corrected by the use of these Grinding Holders.

ARMSTRONG SAFETY DRILL HOLDER

FOR HOLDING MORSE TAPER SHANK DRILLS AND REAMERS

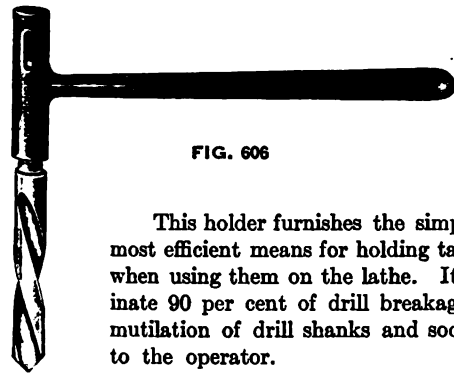


FIG. 606

This holder furnishes the simplest, safest and most efficient means for holding taper shank drills when using them on the lathe. Its use will eliminate 90 per cent of drill breakage in such work, mutilation of drill shanks and sockets and injury to the operator.

No.	Size Shank Morse Taper	Holds Drills Inches	Weight Each Pounds	Price Each
1	No. 1	$\frac{1}{8}$ to $\frac{1}{4}$	$1\frac{1}{2}$	\$0.90
2	No. 2	$\frac{1}{4}$ to $\frac{3}{8}$	2	1.20
3	No. 3	$\frac{3}{8}$ to $1\frac{1}{4}$	4	1.60
4	No. 4	$1\frac{1}{4}$ to 2	7	2.60
5	No. 5	$2\frac{1}{4}$ to 3	$14\frac{1}{2}$	4.00

ARMSTRONG "U" CLAMP DRILL HOLDER

No.	Capacity Inches	Length Inches	Weight Each Pounds	Price Each
200	$\frac{1}{8}$ to 1	11	$2\frac{1}{4}$	\$1.20
300	$\frac{3}{8}$ to $1\frac{1}{2}$	13	4	1.06
400	$\frac{1}{2}$ to 2	$15\frac{1}{2}$	7	2.06
500	$\frac{3}{4}$ to 3	18	$13\frac{3}{4}$	4.00

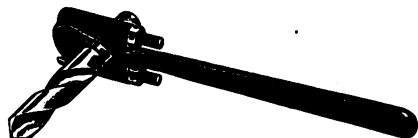


FIG. 605

This tool is designed for use in holding Straight Shank Drills, Reamers or similar tools, with safety to the operator and without danger of injury to the tool held.

STEEL MANDRELS

HARDENED AND GROUND



NO. 121—FIG. 114

Diameter Inches	Price Each	Length Over All Inches	Diameter Inches	Price Each	Length Over All Inches	Diameter Inches	Price Each	Length Over All Inches	Diameter Inches	Price Each	Length Over All Inches
$\frac{1}{4}$	\$0.80	$3\frac{3}{4}$	$1\frac{1}{8}$	\$2.45	$7\frac{1}{2}$	$1\frac{1}{8}$	\$6.00	$10\frac{3}{4}$	$2\frac{1}{8}$	\$14.25	13
$\frac{5}{16}$	.90	4	$1\frac{1}{8}$	2.60	$7\frac{3}{4}$	2	6.50	11	$2\frac{1}{8}$	15.00	13
$\frac{3}{8}$	1.00	$4\frac{1}{4}$	$1\frac{1}{4}$	2.80	8	$2\frac{1}{8}$	7.00	$11\frac{1}{2}$	$2\frac{1}{8}$	15.75	13
$\frac{7}{8}$	1.10	$4\frac{1}{2}$	$1\frac{1}{4}$	3.00	$8\frac{1}{4}$	$2\frac{1}{8}$	7.50	$11\frac{1}{2}$	3	16.50	13
$\frac{1}{2}$	1.20	5	$1\frac{1}{2}$	3.25	$8\frac{1}{2}$	$2\frac{1}{8}$	8.00	12	$3\frac{1}{8}$	18.00	14
$\frac{5}{8}$	1.30	$5\frac{1}{4}$	$1\frac{1}{2}$	3.50	$8\frac{3}{4}$	$2\frac{1}{8}$	8.50	12	$3\frac{1}{4}$	19.50	14
$\frac{3}{4}$	1.40	$5\frac{1}{2}$	$1\frac{1}{2}$	3.75	9	$2\frac{1}{8}$	9.00	12	$3\frac{3}{8}$	21.00	15
$\frac{7}{8}$	1.50	$5\frac{3}{4}$	$1\frac{3}{8}$	4.00	$9\frac{1}{4}$	$2\frac{3}{8}$	9.50	12	$3\frac{1}{2}$	23.00	15
$\frac{1}{4}$	1.60	6	$1\frac{3}{8}$	4.25	$9\frac{1}{2}$	$2\frac{1}{8}$	10.00	$12\frac{1}{2}$	$3\frac{5}{8}$	25.00	16
$\frac{5}{8}$	1.70	$6\frac{1}{4}$	$1\frac{1}{2}$	4.50	$9\frac{3}{4}$	$2\frac{1}{2}$	10.50	$12\frac{1}{2}$	$3\frac{3}{4}$	27.00	16
$\frac{3}{4}$	1.85	$6\frac{1}{2}$	$1\frac{3}{4}$	4.75	10	$2\frac{3}{8}$	11.25	$12\frac{1}{2}$	$3\frac{7}{8}$	29.00	17
$\frac{7}{8}$	2.00	$6\frac{3}{4}$	$1\frac{3}{4}$	5.00	$10\frac{1}{4}$	$2\frac{3}{8}$	12.00	$12\frac{1}{2}$	4	31.00	17
1	2.15	7	$1\frac{7}{8}$	5.50	$10\frac{1}{2}$	$2\frac{1}{2}$	12.75	13	...	.....	..
$1\frac{1}{8}$	2.30	$7\frac{1}{4}$	...	....	....	$2\frac{3}{4}$	13.50	13	...	.....	..

All sizes and dimensions not listed are special and subject to special prices.

These Mandrels are slightly tapered to facilitate their entering holes reamed with Standard Reamers.

The size is stamped on the large end and the diameter taken at a point distant from the small end an amount equal to the diameter.

CHAMPION EXPANDING MANDRELS

Expansion of this set, $\frac{1}{2}$ to $6\frac{1}{2}$ inches. Positively the only Expanding Mandrel which completely fills a hole. Fully guaranteed.



FIG. 115

No.	Range Inches	Length of Arbor Inches	Length of Sleeve Inches	Each
1	$\frac{1}{2}$ up to $\frac{5}{8}$	$5\frac{1}{2}$	$2\frac{1}{2}$	\$ 5.00
2	$\frac{5}{8}$ " " $\frac{3}{4}$	$6\frac{1}{2}$	$2\frac{3}{4}$	5.50
3	$\frac{3}{4}$ " " $\frac{7}{8}$	$6\frac{1}{2}$	$2\frac{3}{4}$	6.00
4	$\frac{7}{8}$ " " 1	$7\frac{1}{2}$	$3\frac{1}{4}$	6.50
5	1 " " $1\frac{1}{8}$	$7\frac{1}{2}$	$3\frac{1}{4}$	7.50
6	$1\frac{1}{8}$ " " $1\frac{3}{8}$	$9\frac{1}{4}$	4	13.50
7	$1\frac{1}{4}$ " " $1\frac{5}{8}$	$9\frac{1}{4}$	4	15.50
8	$1\frac{1}{2}$ " " 2	$11\frac{1}{2}$	5	17.50
9	2 " " $2\frac{3}{4}$	$14\frac{1}{2}$	$5\frac{1}{2}$	26.50
10	$2\frac{3}{4}$ " " $3\frac{3}{4}$	17	6	37.50
11	$3\frac{3}{4}$ " " 5	20	7	60.00
12	5 " " $6\frac{1}{2}$	24	8	75.00

All sizes from No. 1 to No. 5 inclusive have one flexible sleeve only. Price of sleeves two-thirds of price shown.

All sizes from No. 6 upwards have two flexible sleeves to obtain maximum expansion. Price of sleeves, each, one-half of prices shown.

Packed in neat individual boxes.

Price, complete set,..... \$285.00

UNIVERSAL ANGLE PLATE

This tool is very rigid and built to meet the most modern requirements of a precision tool. It can be used in connection with any machine tool, and its use converts any plain tool into a universal. It cuts the cost of die sinking in half. Displace your inaccurate and make-shift rigs with this modern accessory for the tool room and work shop. This device is particularly adapted to the tool room, and used in connection with a grinder, formed cutters can be ground on it by the addition of centers to the platen. It has a motion through 360 degrees horizontally and 90 degrees vertically. It can be adjusted quickly to any angle without disturbing work bolted to it, and the motion of the working surface is through the axis of the arc of its oscillation. Accurate graduations with Vernier attachment reading five minutes, permits of its use for especially fine work.



FIG. 637

DIMENSIONS AND PRICES

Size, Inches	Height Inches	T Slot Width Inches	Weight Lbs.	Price
4 x 6	3 $\frac{1}{8}$	$\frac{1}{8}$	16	.....
6 x 8	6 $\frac{1}{8}$	$\frac{1}{2}$	48	.....
8 x 10	7 $\frac{5}{8}$	$\frac{5}{8}$	98	.....
8 x 10, with worm adjustment	7 $\frac{5}{8}$	$\frac{5}{8}$	98	.....
12 x 18, with worm adjustment	11 $\frac{3}{8}$	$\frac{3}{4}$	440	.....

Special base plate can be supplied if desired, at extra cost.

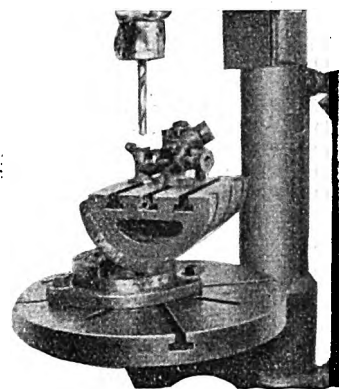


FIG. 637 1/2

SHOWING APPLICATION TO
DRILL PRESS

ARMSTRONG PLANER JACK

These jacks are designed to displace the haphazard devices and methods quite generally in use for leveling work on machine tools, and a glance will show any mechanic their convenience and utility. A set of them on a machine will greatly reduce the proportion of time required for preliminary arrangements as compared with the actual machine time on the job, and will, moreover, by their perfect adjustability and solidity, insure good, true surfaced work.



FIG. 638

No.	Height Contracted Inches	Height Extended Inches	Weight Each Pounds	Price Each
1	2 $\frac{3}{4}$	3 $\frac{3}{4}$	1 $\frac{1}{2}$	\$1.00
2	3 $\frac{3}{4}$	5 $\frac{1}{4}$	3	1.50
3	5 $\frac{1}{4}$	7 $\frac{1}{2}$	6	2.00
4	7 $\frac{1}{2}$	12	12	3.00

LATHE CENTERS

These Lathe Centers are made from Tool Steel, both ends being hardened. The shanks are ground to standard tapers. Included angle of point is 60° and ground true. Special Tapers made to order.



FIG. 622

PRICE LIST

Standard Taper Shank	Length Whole	Length Body	Price Each
No. 0	2 7/8"	3/4"	\$1.00
No. 1	3 1/8"	1"	1.20
No. 2	4 1/8"	1 1/8"	1.50
No. 3	5 1/4"	1 3/8"	2.00
No. 4	6 3/4"	2 1/8"	3.00
No. 5	8 1/2"	3 1/8"	5.00

PIPE CENTERS FOR LATHE

This drawing shows a practical pipe center for the engine lathe. The taper shank "A" fits into the head spindle and tail stock spindle. The conical disc "B" fits loosely and revolves on taper shank "A."

If a pipe is to be machined or threaded in the lathe, hold one end of the pipe in the chuck, and the other end on the pipe center in the tail stock.

Taper Shank "A".....	Price
Disc "B" takes from 1/2" to 3" Pipe.....	
Disc "C" takes from 3" to 5" Pipe.....	
Disc "D" takes from 5" to 8" Pipe.....	
Disc "E" takes from 8" to 12" Pipe.....	
Disc "G" takes from 12" to 16" Pipe.....	
Disc "H" takes from 16" to 20" Pipe.....	
Disc "K" takes from 20" to 24" Pipe.....	

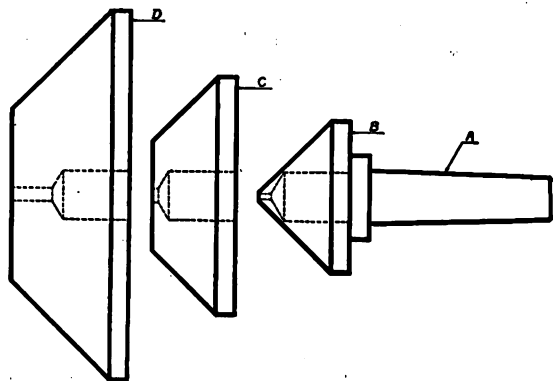


FIG. 3984

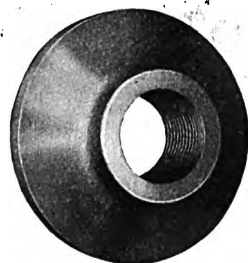


FIG. 624

SEMI-MACHINED LATHE CHUCK PLATES

We can furnish semi-finished or rough chuck plates for any size or type of lathe. When ordering rough chuck plates please be sure to state the size, style and make of chuck to be used and if possible the diameter of the lathe spindle. When ordering semi-finished chuck plates be sure to state the size, style and make of chuck that is to be used. We should also have a sample plate, for instance, the dog plate, face plate, or an old chuck plate so that the proper thread can be turned on the new plate for fitting to the spindle of the lathe. Semi-finished chuck plates are finished on the spindle end only and it is necessary for the purchaser to turn the flange and to fit the chuck.

LECOUNT HEAVY CAST STEEL DOGS

WITH SQUARE HEAD STEEL SCREWS

U. S. STANDARD

POINTS HARDENED

This Dog has a very heavy Boss, so that a heavier screw can be substituted if the thread wears.

SIZES AND PRICES

Size No..	1	2	3	4	5	6	7	8	9	10	11	12
Capacity, In.....	3/8	1/2	5/8	3/4	7/8	1	1 1/8	1 1/4	1 3/8	1 1/2	1 3/4	2
Price, each.....	\$0.40	.50	.60	.60	.70	.70	.80	.80	.95	.95	1.10	1.20

Size No..	13	14	15	16	17	18	19	20	21
Capacity, In.....	2 1/4	2 1/2	3	3 1/2	4	4 1/8	5	5 1/2	6
Price, each.....	\$1.35	1.45	1.60	1.80	2.10	2.75	3.25	4.00	5.00



FIG. 626

ARMSTRONG DROP-FORGED LATHE DOGS

WITH BENT TAIL

Unless otherwise specified, Dogs with Square Screws will be supplied. Screws are not interchangeable.

No.		Capacity	Screws		Price	
With Square Head Screw	With Safety Screw		Square Head, Price, each	Safety, Price, each	Safety Dog Wrench Extra	Dog with either Screw*
1	1-H	$\frac{3}{8}$	\$0.10	\$0.10	\$0.06	\$0.50
2	2-H	$\frac{1}{2}$	.11	.12	.07	.55
3	3-H	$\frac{3}{4}$	.12	.15	.08	.60
4	4-H	1	.14	.18	.09	.70
5	5-H	$1\frac{1}{4}$	.15	.21	.10	.85
6	6-H	$1\frac{1}{2}$	.19	.25	.12	1.00
7	7-H	$1\frac{3}{4}$	.22	.30	.13	1.20
8	8-H	2	.26	.36	.15	1.40
9	9-H	$2\frac{1}{2}$	.33	.43	.19	1.80
10	10-H	3	.36	.43	.24	2.30
11	11-H	$3\frac{1}{2}$	.50	.58	.30	3.00
12	12-H	4	.55	.58	.37	4.50
13	13-H	5	.75	.75	.45	8.00
14	14-H	6	.80	.75	.55	12.00

*Price does not include wrench. When ordering dogs with headless screws specify whether wrenches are wanted or not, and if wanted how many. When not otherwise specified one wrench for each size dog ordered will be shipped and charged for.

ARMSTRONG SAFETY CLAMP LATHE DOGS

This dog is so constructed as to combine a wide range of adjustment with the convenient features of the clamp dog and the simplicity and strength of the ordinary lathe dog. It will accommodate itself readily to work of any shape and will hold it securely and squarely, being especially adapted for use on finished work which would be liable to be damaged by the set screw of a common lathe dog.

The sliding jaw is operated by a loose fitting U bolt, the ends of which are protected by SAFETY Sleeve Nuts and can be adjusted to size very quickly, only a wrench being necessary to tighten. One advantage of this dog is that it can be applied without removing work from centers

Number	Capacity Inches	Weight Each Pound	Price Each
1-U	$\frac{1}{8}$ to $\frac{5}{8}$	$\frac{5}{8}$	\$0.65
2-U	$\frac{3}{8}$ to 1	$1\frac{1}{4}$	.90
3-U	$\frac{5}{8}$ to $1\frac{1}{2}$	3	1.40
4-U	$\frac{7}{8}$ to 2	$4\frac{1}{2}$	2.00
5-U	$1\frac{1}{4}$ to 3	$9\frac{1}{2}$	2.90
6-U	$1\frac{3}{4}$ to 4	16	4.00
7-U	$2\frac{1}{2}$ to 5	21	5.00

WILLIAMS "VULCAN" DROP-FORGED CLAMP LATHE DOGS

These are drop-forged from a strong, tough grade of carefully selected steel and are submitted to a special refining process or "heat treatment" after forging which increases their stiffness and strength and reduces the liability of springing.

The screws, threaded U.S. Standard, are made of a special grade of steel, well adapted to the purpose and are hardened and tempered. The nuts are case hardened. Extra Screws and Nuts carried in stock.

The nuts furnish ready means of arrangement for the minimum projection of Screws beyond the body of Dog and thus lessen the danger to the operator when tool is in use.

Number	Capacity		Screws		Price, Dog Complete
	Maximum Opening	Distance between Screws	Diameter	Length Under Head	
61	$1\frac{5}{8}$	$1\frac{3}{4}$	$\frac{1}{8}$	$2\frac{3}{4}$	\$1.50
62	$1\frac{1}{2}$	$2\frac{1}{4}$	$\frac{3}{8}$	$3\frac{1}{4}$	2.00
63	$2\frac{1}{4}$	$2\frac{3}{4}$	$\frac{1}{2}$	$4\frac{1}{4}$	2.50
64	$3\frac{1}{4}$	$3\frac{1}{2}$	$\frac{3}{4}$	$5\frac{1}{2}$	3.50

Per Set, one each of four sizes. Mounted on a board for shop use if specified.....\$9.50

WITH SQUARE HEAD SCREW



FIG. 623

WITH SAFETY SCREW



FIG. 625



FIG. 627

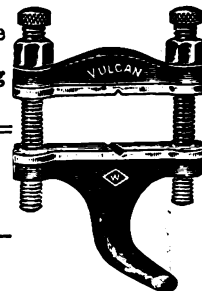


FIG. 628

CUSHMAN INDEPENDENT 4-JAW CHUCK

HEAVY PATTERN

REVERSIBLE JAW

IRON BODIES

DESIGNED FOR THE HARDEST SERVICE

MORTISED HEAD SCREWS

HARDENED STEEL THRUST BEARINGS

LARGE DIAMETER RECESS FOR FLANGE PLATE

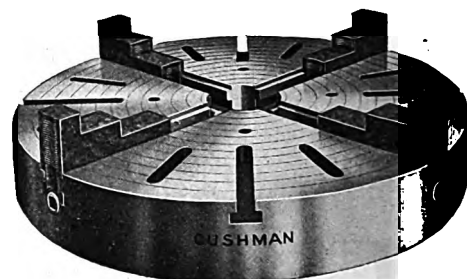


FIG. 640

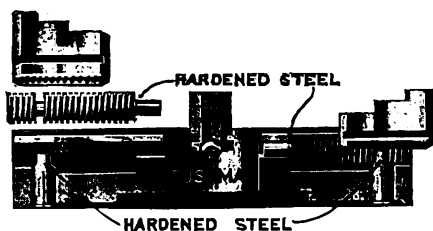


FIG. 639

This type of chuck is designed for holding pieces of any shape, each jaw being operated independently of the others. The chuck is known as the heavy pattern and is made very heavy and strong. The body of style 12 is made from a superior quality of gray iron, and plenty of it is used wherever needed. The 8-inch size and under have solid faces; the 9-inch and 10-inch have openings in the faces; the 12-inch, 14-inch, 15-inch and 16-inch have T slots, and the 18-inch and over have both the T slots and openings. The recess for flange plates is large in diameter, and when the flange plate is bolted to the chuck body additional strength and solidity are obtained. The ribs on which the jaws slide are made unusually large and will stand the heavy strains without breaking or unduly wearing away. The body is provided with hardened steel thrust bearings for the screws, as shown in illustration.

The JAWS are made from Open Hearth Steel and they are carefully fitted to the body and case hardened. They are made in one piece and can be quickly and easily reversed by running them out of the body and turning them end for end.

The SCREWS are made of steel with heavy square threads, and none of the threaded portion is used for the bearing. The thread extends to the outer end of screw which allows the jaw to be opened very wide and giving great capacity to the chuck. These screws are equipped with hardened steel thrust bearings, as shown in illustration.

These chucks are to be fitted to machine by means of an intermediate flange plate or adapter; the body being recessed for the purpose and provided with bolt holes. With every chuck we furnish bolts for attaching.

The capacity of these chucks is as great as any chuck made of this type, and they will hold pieces from 1 to 4 inches larger than their rated diameter. The safe capacity of this type of Chuck, however, as in all makes of this pattern, is but little beyond its nominal size.

A powerful steel wrench for operating the jaws is furnished with each chuck.

APPROXIMATE DIMENSIONS AND PRICES

Nominal Size	List Price	Will Hold About Inches	Hole in Body Inches	Diameter of Recess for Flange, Inches	Weight, Lbs.	From Bottom of Recess to Face of Body, Inches
4½	\$40.00	5	1	4½	8	2
6	44.00	7	1½	5½	14	2
8	52.00	9	1¾	4¾	30	2½
9	56.00	11	1¾	4¾	35	2½
10	60.00	12	2	5½	42	2¾
12	70.00	14	2¾	6½	70	2¾
14	80.00	16	3	6½	90	2¾
15	86.00	18	3	7½	105	2¾
16	92.00	19	3	7½	120	2¾
18	108.00	21	4	9½	160	3½
20	124.00	23	4	9½	200	3½
22	140.00	25	5	11	240	3½
24	160.00	27	5	11	285	3½
26	186.00	29	5	12	310	3½
28	220.00	31	5	13	355	3½
30	260.00	34	5	15	440	3¾

Larger sizes on application.

CUSHMAN PORTABLE FACE PLATE JAWS

FOR USE ON LARGE LATHES, BORING MILLS, ETC. A PERFECT SUBSTITUTE FOR THE LARGE AND EXPENSIVE CHUCKS. EASILY ATTACHED—ADJUSTABLE TO ANY POSITION—JAWS REVERSIBLE—DESIGNED FOR HARD SERVICE.

STYLE 18—REGULAR DESIGN, IRON BODY

APPROXIMATE DIMENSIONS, PRICES, ETC.

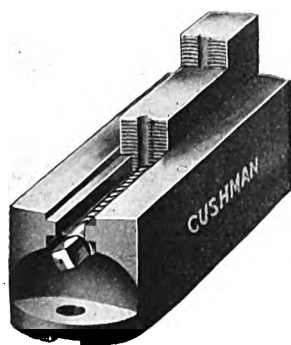


FIG. 647

Nominal size.....inches	6	8	10	12	14
Length of body....."	6	8	10	12	14
Length over all....."	7¼	9½	12	14	16
Width of body....."	3¼	3½	4¼	5	5½
Height of body....."	3	3½	4	4½	4¾
Distance from center to center of bolt holes....."	6	8¾	10¾	12½	14½
Length of sliding jaw....."	4¾	5	6	7½	8
Width of sliding jaw....."	1½	1½	1¾	2	2¼
From face of body to top of jaw...."	1½	2	2½	2¾	3½
Diameter of bolt....."	¾	¾	¾	1	1¼
Length of bolt under head....."	2¾	2¾	3½	3½	4¼
Square of bolt head....."	1½	1½	1½	1¾	2
Thickness of bolt head....."	½	½	½	¾	¾
Weight, complete.....lbs...	15	23	40	60	100
Price, set of three.....	\$78.00	\$96.00	\$120.00	\$168.00	\$216.00
Price, set of four.....	104.00	128.00	160.00	224.00	288.00

SKINNER ALL STEEL INDEPENDENT LATHE CHUCK

STYLE 1900. WITH FOUR SOLID REVERSIBLE JAWS

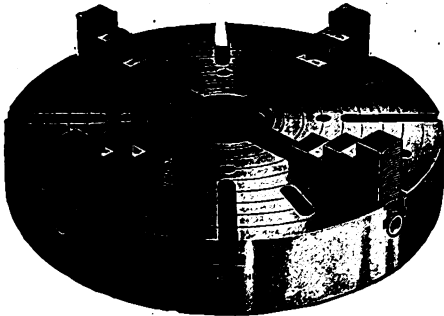


FIG. 641

Bolts—A set of 4 bolts is furnished with each Chuck.

Wrench—A powerful T handle steel wrench of suitable proportion is furnished with each Chuck.

Number	Rated Size of Chuck Inches	Will Hold About Inches	Approximate Shipping Weight Lbs.	List Price
1908	8	9½	34	\$ 84.00
1909	9	11½	43	92.00
1910	10	12½	53	100.00
1912	12	14½	86	116.00
1914	14	16½	113	134.00
1915	15	18	134	142.00
1916	16	19	145	152.00
1918	18	21	191	174.00
1920	20	23	214	200.00
1922	22	25	242	228.00
1924	24	27	308	260.00
1926	26	29	358	300.00
1928	28	31	367	350.00
1930	30	35	559	400.00
1934	34	39	690	600.00
1936	36	41	711	690.00

Order by number.

Body—A single casting, made from steel of great tensile strength, well proportioned, and highly finished, the face being ground true to straight edge, and accurately graduated in inches, the larger sizes being very heavy. 8" and smaller have solid face. 9" and 10" have openings in the face between the jaws. 12" to 16" have T slots in the face, as shown in cut. 18" and larger have T slots and openings in the face.

Jaws—The jaws are made of steel and thoroughly case hardened, and have raised and ground steps. They are reversed by running off the screw at the periphery and turning end for end.

Screws—The screws are made of a fine quality of steel, are of large diameter with a heavy square thread, are nicely fitted to the bearings, and are threaded the full length, giving a long range of adjustment to the jaws.

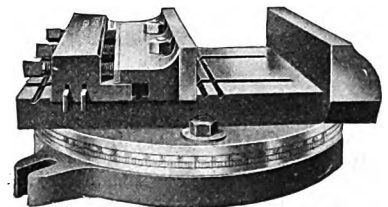
Bearings—Hardened steel thrust bearings for the jaw adjusting screws make this Chuck practically indestructible.

SKINNER PLANER CHUCKS

The heaviest and strongest Planer Chuck made.

This Chuck is made heavy and strong throughout, and accurately graduated in degrees. Holds either straight or taper work, and the jaws are so constructed that work will not raise from the bed. The jaws are heavy and will permit of repeated dressing after having become bruised from hard service.

Round Base Chucks have a rib 1¼ inches wide cast on bottom, to fit in planer table. This rib adds to the strength of the Chuck and the machining of the rib is a simple operation.



ROUND SWIVEL BASE CHUCK
FIG. 644

ROUND SWIVEL BASE—SQUARE BASE. PRICE LIST AND DIMENSIONS

Round Swivel, Base Chuck							Square Base Chuck		
Size Chuck No.	Length of Jaw *Inches	Depth of Jaw *Inches	Jaws will open *Inches	Space required Inches	Approx. shipping weight Lbs.	Price	Space required Inches	Approx. shipping weight Lbs.	Price
6	7	1½	3½	10	77	\$64.00	7½x11	55	\$44.00
8	9	1⅞	5	11½	95	76.00	9 x12½	68	54.00
10	11	2⅞	6	14	165	90.00	11 x15	110	64.00
12	13	2⅞	8	16	220	108.00	13 x17	130	76.00
15	15½	2½	9½	20	310	140.00	15½x21	234	100.00
18	18½	2½	11¼	22	442	180.00	18½x24	320	128.00
24	24¼	2¾	16	26	722	260.00	24¼x28	508	184.00
30	30¼	3	21½	33	1200	400.00	30¼x34	1056	350.00

*Round Swivel Base and Square Base same dimensions.

When necessary to use round swivel base chucks at angle 45 degrees, space required will be greater than shown in table.

Square Base Chucks have a flange on all sides for clamping to planer table.

CUSHMAN UNIVERSAL GEARED SCROLL CHUCKS

STYLES OF JAWS FOR CUSHMAN CHUCKS

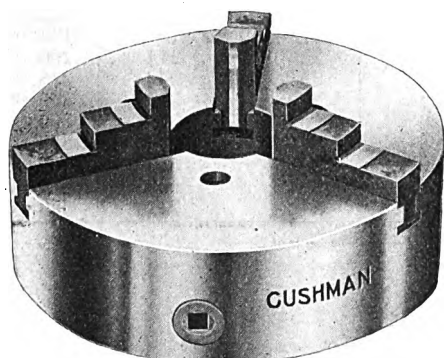
Style No. 1 (outside) with steps going down towards the center of chuck. Most generally used for ordinary lathe work. With this style pieces as large as the chuck itself may be held.

Style No. 2 (inside) with steps going down towards the periphery of the chuck. Will hold drills, rods, etc., as large as the diameter of hole in chuck body, but will open to hold pieces about one-half the diameter of chuck body. With this style, rings, etc., can be held by the inside while the outside is being finished.

When chucks are ordered with two sets of jaws, or with both sets of jaws, we understand one set is to be No. 1 Style and the other set No. 2 Style.

THREE-JAW TYPE

WITH THREE OUTSIDE OR INSIDE JAWS, OR BOTH



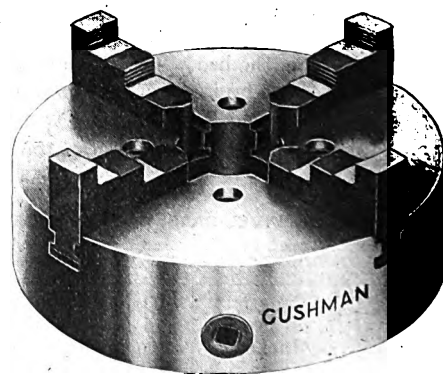
NO. 32—FIG. 645

Size Inches	No. 31 With Outside Jaws Each	No. 32 With Inside Jaws Each	No. 34 With Two Sets Jaws Each	Diameter Hole Inches	Recess for Face Plate Inches
3	\$ 34.00	\$ 34.00	\$ 40.00	$\frac{5}{8}$	$2\frac{7}{8}$
4	38.00	38.00	44.00	1	$3\frac{1}{8}$
5	42.00	42.00	48.00	$1\frac{1}{4}$	$3\frac{3}{4}$
6	48.00	48.00	56.00	$1\frac{3}{8}$	$4\frac{1}{4}$
$7\frac{1}{2}$	54.00	54.00	64.00	2	$4\frac{3}{4}$
9	66.00	66.00	76.00	$2\frac{1}{2}$	$5\frac{5}{8}$
$10\frac{1}{2}$	76.00	76.00	88.00	3	$5\frac{5}{8}$
12	90.00	90.00	104.00	3	7
15	120.00	120.00	140.00	$3\frac{1}{4}$	7
18	160.00	160.00	184.00	$3\frac{1}{4}$	$9\frac{1}{2}$
21	210.00	210.00	240.00	$3\frac{1}{4}$	$9\frac{1}{2}$

FOUR-JAW TYPE

WITH FOUR OUTSIDE OR INSIDE JAWS, OR BOTH

Size Inches	No. 41 With Outside Jaws Each	No. 42 With Inside Jaws Each	No. 44 With Two Sets Jaws Each	Diameter of Hole Inches	Recess for Face Plate Inches
3	\$ 38.00	\$ 38.00	\$ 44.00	$\frac{5}{8}$	$2\frac{7}{8}$
4	42.00	42.00	48.00	1	$3\frac{1}{8}$
5	46.00	46.00	54.00	$1\frac{1}{4}$	$3\frac{3}{4}$
6	54.00	54.00	62.00	$1\frac{3}{8}$	$4\frac{1}{4}$
$7\frac{1}{2}$	60.00	60.00	72.00	2	$4\frac{3}{4}$
9	72.00	72.00	84.00	$2\frac{1}{2}$	$5\frac{5}{8}$
$10\frac{1}{2}$	84.00	84.00	98.00	3	$5\frac{5}{8}$
12	100.00	100.00	116.00	3	7
15	130.00	130.00	152.00	$3\frac{1}{4}$	7
18	174.00	174.00	204.00	$3\frac{1}{4}$	$9\frac{1}{2}$
21	230.00	230.00	270.00	$3\frac{1}{4}$	$9\frac{1}{2}$
....



NO. 41—FIG. 646

Nos. 31 and 41 have outside jaws of the type most generally used for ordinary lathe work, as may be noted in cut. With this type jaw pieces as large as the Chuck itself may be held. Nos. 32 and 42 have inside jaws, adapted for holding bars, rods, drills, and special tools. The steps on the outside are for holding rings, etc.

Nos. 34 and 44 have two sets of jaws, one each inside and outside, which can be changed easily and quickly. Having both sets, these Chucks are adapted for any kind of work and are generally the most useful.

For Lathes and machines requiring larger Chucks than above, see face plate jaws. To secure the most satisfactory results from any Chuck it should be occasionally taken apart, cleaned and oiled, and if any rough surfaces are found they should be smoothed. No wrench should be used except that which is supplied with the Chuck. Special Jaws at special prices.

CUSHMAN 2-JAW CHUCKS

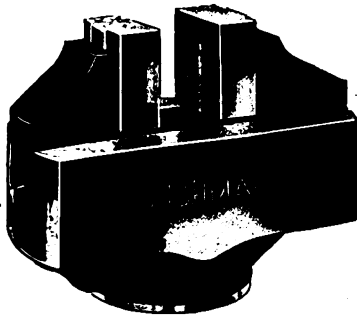


FIG. 643

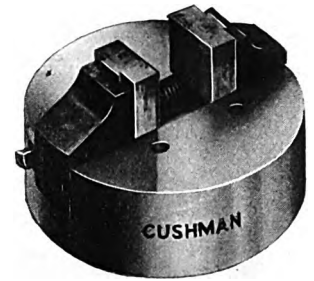


FIG. 642

MADE IN EIGHT STYLES

Style	Body	Jaws
21	Round with recess in back for flange plate.	Work universally with each other, have V Groove. Grooves in large sizes are checked. Can be furnished having plain blank soft jaws.
22	"	Work universally with each other. Are dove-tailed for slips. One pair of machinery steel slips furnished with each chuck but tool steel slips can be substituted or added.
23	"	Work independently of each other. Have V Groove. Grooves in larger sizes are checked. Screws are beneath the jaws but do not cross nor obstruct the hole through body. Can be furnished having plain blank soft jaws.
24	"	Work independently of each other. Are dove-tailed for slips. One pair of machinery steel slips furnished with each chuck but tool steel slips can be substituted or added. Screws are beneath the jaws but do not cross nor obstruct the hole through body.
25	Box with hub which can be threaded to fit spindle.	Work together by means of right and left screws. Are dove-tailed for slips. One pair of machinery steel slips furnished with each chuck but tool steel slips can be substituted or added. Screw is beneath the jaws, and hole in body is thereby obstructed.
26	"	Work independently of each other. Are dove-tailed for slips. One pair of machinery steel slips furnished with each chuck but tool steel slips can be substituted or added. Screws are beneath the jaws but do not cross nor obstruct the hole through the body.
27	Box with recess for flange plate.	Work together by means of right and left screw. Are dove-tailed for slips. One pair of machinery steel slips furnished with each chuck but tool steel slips can be substituted or added. Screw is beneath the jaws, and hole in body is thereby obstructed. To be fitted to machine by means of an intermediate flange plate.
28	"	Work independently of each other. Are dove-tailed for slips. One pair of machinery steel slips furnished with each chuck but tool steel slips can be substituted or added. Screws are beneath the jaws but do not cross nor obstruct the hole through body. To be fitted to machine by means of an intermediate flange plate.

CUSHMAN 2-JAW CHUCKS

APPROXIMATE DIMENSIONS

Nominal size.....	4"	6"	7"	9"	12"	15"	18"
Diameter of body, Styles 21, 22, 23, 24.....	4½	6	7	9	12	15	18
Hole through body, Styles 21 to 24.....	1	1½	1½	1¾	2¼	3	3½
Thickness of body, Styles 21 to 24.....	2¾	2¾	3¾	3½	3½	4	4½
Diameter of recess for flange plate, 21 and 22.....	4½	5½	6¾	6¾	9½	11	13
Diameter of recess for flange plate, 23 and 24.....	4½	5½	5½	5½	6½	7	8
Diameter of recess for flange plate, 27, 28.....	4½	5½	4¾	5½	7	7	9½
Jaws, open, Styles 21 and 23 (about).....	1¼	1½	2	2½	3	3	3
Jaws, open, Styles 22, 24 (about).....	2	2½	3	4	6	8	10
Jaws, open, Box Body Chucks (about).....	1	1	1	1½	1½	2	2½
From face of body to top of jaws, Styles 21, 23.....	1¼	1½	1¾	2	2½	3½	4
From face of body to top of jaws, Styles 22, 24.....	1¼	1½	1¾	2	2½	3½	4
From face of body to top of jaws, Box Body Chucks.....	1¼	1½	1¾	2	2½	3½	4
Width of jaws, Styles 21 to 28.....	1½	1¾	1¾	2	2¼	2¼	2¼
Depth of V groove, Styles 21, 23.....	1	¾	¾	¾	¾	¾	¾
Length of body, Box Body Chucks.....	1	1	1	1	1	1	1
Width of body, Box Body Chucks.....	1	1	1	1	1	1	1
From face of body to end of hub, Styles 25, 26.....	1	1	1	1	1	1	1
Diameter of hub, Styles 25, 26.....	1	1	1	1	1	1	1
Hole in hub, Styles 25, 26.....	1	1	1	1	1	1	1
Weight, Styles 21, 22, 23, 24..... (Pounds)	10	20	33	49	79	115	175
Weight, Box Body Chucks..... (Pounds)	10	20	20	31	48	75	125

CUSHMAN 2-JAW CHUCKS

PRICE LIST

Nominal size.....	4½"	6"	7"	9"	12"	15"	18"
Prices, Styles 21 to 24.....	\$40.00	\$48.00	\$60.00	\$70.00	\$90.00	\$100.00	\$150.00
Prices, Styles 25 to 28.....	3.00	3.00	3.00	3.50	3.50	4.00	5.00
Extra slips, per pair.....	6.00	6.00	6.00	8.00	10.00	12.00	17.00
Extra tool steel slips, per pair.....	6.00	6.00	6.00	8.00	10.00	12.00	17.00

Largest round body chuck is 12 inches. Smallest box body-chuck is 7 inches.

"D & W" MAGNETIC CHUCKS

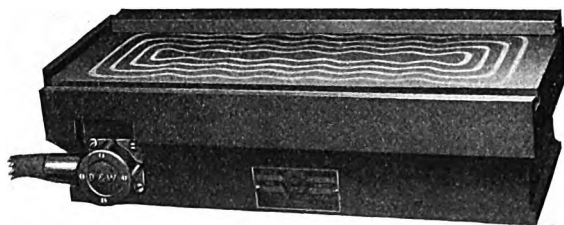


FIG. 648
FLAT CHUCK

Alternating current cannot be used. In ordering chucks, specify the voltage of your lighting circuit. "D & W" Magnetic Chucks are both oil proof and water proof, and are equipped with special Demagnetizing Switches for readily releasing the work.



FIG. 649
ROTARY CHUCK

As a labor saver, there is probably no form of electrical device that has proved of greater benefit in the machine shop than the magnetic chuck. It possesses a very wide range of usefulness in holding steel and iron pieces for grinding, planing, shaping and milling. When a large number of pieces are to be machined, it will frequently be found that the time and labor saved by the use of this device as compared with the old time methods of clamping, bolting or holding one piece at a time in a vise, will pay the entire first cost of a chuck within a very short time.

We can furnish an extended line of flat and rotary chucks, together with a variety of attachments which convert flat chucks into the Vertical, Taper or Swiveling types as required. The flat chucks have a horizontal face and are equipped with adjustable end and side stops, providing convenient means for locating and steadying the work on the surface of the chucks. They are particularly useful in holding work for grinding, such as file blanks, scale blanks, thickness gauges, punches, dies, knives for wood working machinery, accurate shims, gibs, or practically any work on which it is necessary to grind flat surfaces. Thin stock can be held for grinding on one face without the distortion due to clamping the edges.

Milling operations can be performed with great facility where the shape of the work is such that the end stop of the chuck can be raised to take part of the thrust. When used in this way, the smallest flat chuck will hold a 1 inch x 2 inch x 6 inch bar of tool steel strongly enough to mill .050 inch off the surface 2 inches wide, with a feed of 1 inch per minute.

In like manner, the chuck will be found very useful for holding stock undergoing light planing and shaping operations. Plane parallels, keys and such parts can be rapidly and accurately produced.

"D & W" rotary chucks have met with great success in plants manufacturing ball and roller bearings.

They have no equal for holding ball races while being ground to finished size.

The rotary chucks are also especially adapted for grinding piston rings to fit the ring grooves, with the utmost accuracy.

FLAT CHUCKS

ROTARY CHUCKS

Style	Extreme Holding Face	Extreme Base Dimensions	Height	Price Each	Style	Diameter	Width to Face Plate Seat	Diam. of Face Plate Seat	Price Each
F- 7- 8	8 $\frac{3}{4}$ x 7	8 $\frac{1}{2}$ x 6	4 $\frac{1}{8}$	....	R- 3	4 $\frac{1}{8}$	2 $\frac{1}{2}$	5 Morse Taper	....
F- 5-13	13 $\frac{1}{4}$ x 5 $\frac{1}{8}$	13 x 4 $\frac{3}{4}$	4 $\frac{1}{8}$	....	R- 6	6	3 $\frac{1}{2}$	4	....
F- 7-16	16 $\frac{1}{4}$ x 7	16 $\frac{1}{2}$ x 6	4 $\frac{1}{4}$	....	R- 8	8	3 $\frac{3}{4}$	4 $\frac{3}{8}$	....
F- 8-20	18 $\frac{3}{8}$ x 9 $\frac{1}{4}$	18 $\frac{1}{2}$ x 8	4 $\frac{1}{8}$	....	R-10	10	3 $\frac{7}{8}$	5	....
F- 8-24	23 $\frac{7}{8}$ x 9 $\frac{1}{8}$	23 $\frac{3}{8}$ x 8	4 $\frac{1}{8}$	....	R-12	12	4 $\frac{1}{8}$	5	....
F-10-31	31 $\frac{1}{2}$ x10 $\frac{1}{4}$	31 $\frac{1}{4}$ x 9 $\frac{3}{8}$	4 $\frac{1}{2}$	....	R-14	14	4 $\frac{1}{2}$	7	....
F-13-21	22 x13 $\frac{1}{4}$	21 $\frac{3}{4}$ x12 $\frac{3}{8}$	4 $\frac{1}{2}$	....	R-16	16	4 $\frac{3}{4}$	7	....
F-13-33	33 $\frac{1}{8}$ x13 $\frac{1}{4}$	32 $\frac{1}{4}$ x12 $\frac{3}{8}$	4 $\frac{5}{8}$	....	R-18	18	4 $\frac{7}{8}$	8	....
F-10-47	47 $\frac{1}{4}$ x10 $\frac{1}{2}$	47 x 9 $\frac{1}{8}$	6 $\frac{3}{8}$	....	R-20	20	4 $\frac{7}{8}$	8	....
F-13-42	42 $\frac{5}{8}$ x13 $\frac{1}{4}$	42 $\frac{3}{8}$ x12 $\frac{3}{8}$	4 $\frac{5}{8}$	....	R-24	24	5	10	....
F-14-48	48 $\frac{1}{2}$ x14	48 $\frac{1}{4}$ x13 $\frac{1}{8}$	5 $\frac{1}{4}$	....	R-30	30	5 $\frac{3}{8}$	14	....
F-12-72	72 $\frac{1}{8}$ x12 $\frac{1}{2}$	71 $\frac{7}{8}$ x12 $\frac{1}{4}$	5 $\frac{1}{4}$	....	R-38	38	...	....	....
F-12-88	87 $\frac{5}{8}$ x12 $\frac{1}{2}$	87 $\frac{3}{8}$ x12 $\frac{1}{4}$	5 $\frac{1}{4}$	....				

ALTERNATING CURRENT CANNOT BE USED.

STAR DRILL CHUCKS

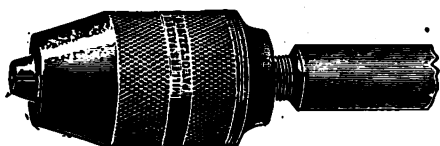


FIG. 671

Substantial chucks, handsomely polished and with machinist's finish. Three jaws, carefully adjusted in a socket, opening with a spring and closing with pressure from spindle. Springs are protected from injury and will not get out of order. Grip tenaciously and center accurately, round shanks.

Numbers.....	4	5	6	7
Capacity, inch.....	$0\frac{1}{8}$	$0\frac{1}{4}$	$0\frac{3}{8}$	$0\frac{1}{2}$
Outside diameter of chuck, in..	$\frac{1}{4}$	1	$1\frac{1}{4}$	$1\frac{1}{2}$
Dimension of shank, in.....	$2\frac{1}{2} \times \frac{1}{2}$	$2\frac{1}{2} \times \frac{1}{2}$	$2\frac{1}{2} \times \frac{1}{2}$	$2\frac{1}{2} \times \frac{1}{2}$
Weight, oz.....	6	7	10	17
Price.....	\$2.80	\$3.80	\$5.60	\$7.80

Chucks furnished to order with shanks as follows without extra charge:

Numbers.....	5	6	7
Diameter of shank, inch.....	$\frac{1}{4}$	$\frac{1}{4}$	$\frac{1}{4}$ or $\frac{3}{8}$

Special shanks, straight or taper, at additional charge of 50 cents each. When ordering taper shanks, take care to state exact taper wanted.

GOODELL-PRATT DRILL CHUCKS

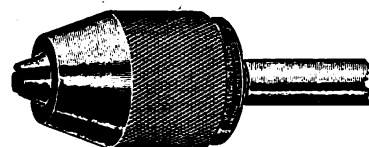


FIG. 653

No spanner wrench is required with this chuck. It can be tightened or loosened easily without one. The shank or spindle is arranged to receive a stud which, as the shell is turned, forces the jaws forward and tightens the chuck.

The three hardened steel jaws are held apart by separating springs which draw the jaws back as the chuck is loosened.

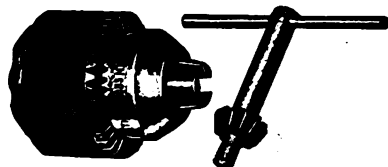
Well finished, strong, accurate.

Fitted with $\frac{1}{4}$ -inch or $\frac{1}{2}$ -inch shanks for angular or blacksmith drills, or with Morse taper shanks, as desired.

Number.....	14	15	$15\frac{1}{2}$	16
Capacity, inch.....	$\frac{1}{2}$	$\frac{1}{4}$	$\frac{3}{8}$	$\frac{1}{2}$
Straight shanks $\frac{1}{2}$ or $\frac{1}{4}$ in., Price.....	\$3.00	\$4.00	\$4.80	\$6.40
Morse Taper No. 1 or No. 2.....	5.00	6.00	7.00	9.00

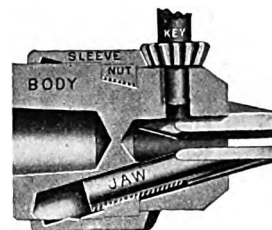
Half-inch shanks sent unless otherwise specified.

JACOBS IMPROVED DRILL CHUCKS



REGULAR—FIG. 654

The toothed sleeve and key distinguish this chuck from other makes. By means of this key, a drill, tap or other tool can be easily and securely tightened, as the action of the key differs from that of the ordinary spanner, in that it is not inclined to revolve the spindle.



FLAT BACK—FIG. 4017

PRICE LIST

Number	Price each	Style	Length Inches	Cap. Inches	Diam. Inches
1	\$11.00	Regular	$1\frac{1}{4}$	0 to $\frac{1}{4}$	$1\frac{1}{4}$
1A	11.00	Flat Back	$1\frac{1}{4}$	0 to $\frac{1}{4}$	$1\frac{1}{4}$
2	11.00	Regular	$2\frac{1}{4}$	0 to $\frac{1}{2}$	$1\frac{1}{4}$
2A	11.00	Flat Back	$2\frac{1}{4}$	0 to $\frac{1}{2}$	$1\frac{1}{4}$
3	18.00	Regular	$3\frac{1}{4}$	0 to $\frac{3}{8}$	$2\frac{1}{4}$
3A	18.00	Flat Back	$3\frac{1}{4}$	0 to $\frac{3}{8}$	$2\frac{1}{4}$
4	36.00	Regular	$4\frac{1}{4}$	$\frac{1}{8}$ to $\frac{3}{4}$	$2\frac{1}{8}$
5	50.00	Regular	$5\frac{1}{4}$	$\frac{3}{8}$ to 1	$3\frac{3}{8}$
6	18.00	Regular	$3\frac{1}{8}$	0 to $\frac{1}{2}$	$1\frac{1}{2}$
6A	18.00	Flat Back	$3\frac{1}{8}$	0 to $\frac{1}{2}$	$1\frac{1}{2}$

ARBORS FOR JACOBS CHUCKS

We endeavor to carry a complete line of the following taper and straight shanks in stock, and can usually make immediate shipment upon receipt of orders.

Chuck	No. 1	No. 2	No. 3	No. 4	No. 5	No. 6
No. 1 Morse Taper	\$1.60	\$1.60	\$2.40	\$2.80	\$4.00	\$2.40
No. 2 Morse Taper	1.60	1.60	2.40	2.80	4.00	2.40
No. 3 Morse Taper	2.40	2.40	2.40	2.80	4.00	2.40
No. 4 Morse Taper	4.00	4.00	4.00	4.00	5.00	4.00
$\frac{1}{2}$ in. straight shank	1.40	1.40	1.60	2.40	3.20	1.60
$\frac{1}{4}$ in. straight shank	1.40	1.40	1.60	2.40	3.20	1.60

The arbors for "A" chucks are the same as regulars.

CUSHMAN DRILL CHUCKS

"THE HARTFORD"

Two-Jaw Chucks. Jaws have interlocking teeth. Jaws operated by right and left screw. Taper hole in back for arbor. These chucks are designed for the hardest service that a chuck can be put to. There are but four pieces in its construction, and they are of such shape as not to be easily broken, even through misuse. The body is very solid. The jaws interlock, in a special manner, and they will firmly hold drills without damage to their shanks. The screw is large in diameter, and will firmly hold the jaws in position without breaking. A taper hole in the hub or back of chuck enables it to be easily attached to machine.

These chucks may be used for a great variety of work, holding drills, rods, taps, reamers, etc., and while designed for heavy work, they are no less adapted for fine, accurate drilling and turning.



FIG. 650

No.	Price	Diameter	Length	Weight	Capacity
0	\$12.00	1 3/4 inches	2 1/2 inches	1 1/4 pounds	0 to 1/4 inch
00	13.00	1 3/4 "	2 3/8 "	1 1/4 "	0 to 3/8 "
1	14.00	2 3/8 "	2 3/4 "	2 1/4 "	0 to 1/2 "
2	16.00	2 7/8 "	3 1/4 "	4 1/2 "	0 to 3/4 "
3	20.00	3 1/8 "	4 1/4 "	8 "	1/2 to 1 "

Nos. 00, 0 & 1 take Arbors 142, 143, 151, 152, 153.

No. 2 takes Arbors 144, 145, 154, 155, 156.

No. 3 takes Arbors 146, 147, 157, 158, 159.

ARBORS FOR HARTFORD CHUCKS



FIG. 651
FINISHED STRAIGHT SHANK

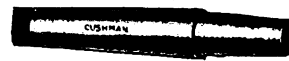


FIG. 652
MORSE TAPER SHANK

Number.....	142	143	144	145	146	147	151	152	153	154	155	156	157	158	159
Fitted for chuck, No.....	0-00-1	0-00-1	2	2	3	3	0-00-1	0-00-1	0-00-1	2	2	2	3	3	3
Round shank, dia., ins.....	1/2	1/2	1/2	5/16	1/2	5/16	...	...	...	...	...	...	...	...	...
Morse taper shank.....	...	...	...	...	...	...	1	2	3	1	2	3	1	2	3
Price, each.....	\$1.00	1.00	1.60	1.60	2.50	2.50	2.50	2.50	3.00	2.50	2.50	3.00	2.50	2.50	3.00

STANDARD IMPROVED DRILL CHUCKS

This chuck has no projecting jaws, and the plate prevents the use of larger tools than the chuck is designed for. It is very substantial, guaranteed to hold true and not injure the shank of the drill. The jaws are guided by three strong gibs, and the screws are larger than in any chuck of similar size and type. The jaws and screws are of tool steel, carefully tempered. The hole in the hub is made to fit a taper arbor, but can be bored out and threaded to a special templet at small cost.

No.	Price	Diam. Inches	Length Over All Inches	Capacity Inches	Size of Tapered Hole in Hub
00	\$12.00	1 3/8	2 1/2	0 to 1/4	.533x.587x 1/8 in. deep
0	13.00	1 1/2	2 1/4	0 to 3/8	.533x.596x1 in. deep
1	14.00	2 1/8	2 1/4	0 to 1/2	.533x.596x1 in. deep
2	16.00	2 3/8	3 3/8	0 to 3/4	.750x.810x1 1/8 in. deep
3	20.00	3 1/8	4 1/4	0 to 1	.876x.967x1 1/8 in. deep

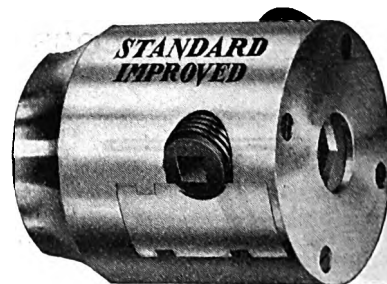
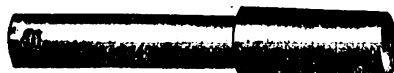


FIG. 3985

ARBORS FOR STANDARD IMPROVED DRILL CHUCKS



STRAIGHT SHANK—FIG. 3986



TAPER SHANK—FIG. 3987

Fitted for Chuck No.....	00	0	1	2	3
Straight Shank, diameter inches.....	1/2 or 5/16	1/2 or 5/16	1/2 or 5/16	1/2 or 5/16	1/2 or 5/16
Price, each.....	\$1.00	\$1.00	\$1.00	\$1.50	\$2.00
Morse Taper Shank No. 1.....	2.00	2.00	2.00	2.00	2.00
Morse Taper Shank No. 2.....	2.00	2.00	2.00	2.00	2.00
Morse Taper Shank No. 3.....	2.50	2.50	2.50	2.50	2.50
Morse Taper Shank No. 4.....	3.00	3.00	3.00	3.00	3.00

SKINNER DRILL CHUCKS

"NEW MODEL"

The Skinner "New Model" Drill Chuck is especially adapted for all light and rapid drilling, such as is done on sensitive Drills and hand Lathes, and where accuracy is required. The Chuck is operated by hand, and tightened by means of a spanner wrench.

The Chuck may be taken apart readily for cleaning and oiling by removing the three screws in the cap, taking that off, and revolving the nut enough to disengage the Jaws. In putting the Chuck together it is necessary to notice that the number of the Jaw corresponds with the number of the slot in the Chuck body.

A hole the full capacity may be drilled through the center without injury to the Chuck, making it convenient to use for holding rods, etc.

The Jaws are ground true in the Chuck after the Jaws are hardened. Every Chuck is guaranteed to be accurate within .002".



FIG. 655

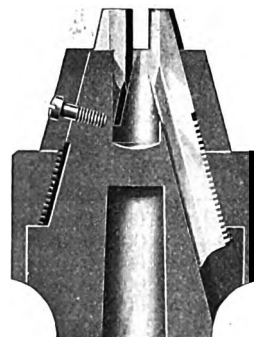


FIG. 655 1/2

No.	List Price Each	Capacity Inch	Outside Diam. Inches	Length of Body Inches	Total Length Jaws Ext'd. Inches
11	\$11.00	0 to $\frac{1}{2}$	$1\frac{3}{8}$	$1\frac{5}{16}$	$2\frac{3}{8}$
12	11.00	0 to $\frac{3}{8}$	$1\frac{1}{8}$	$2\frac{3}{8}$	$2\frac{1}{4}$
13	18.00	0 to $\frac{1}{4}$	$2\frac{1}{8}$	$3\frac{1}{16}$	$4\frac{1}{8}$

"GEARED PATTERN"

The Skinner "Geared Pattern" Drill Chuck is recommended for use on Drills and Lathes because of its Accuracy and Convenience. The Gears are all enclosed "beneath the surface" (patented) of the Chuck away from chips and dirt. The Chuck is hand operated save for final grip on drill, by means of a common wrench, which has no tendency to revolve the spindle of the lightest machine. It is made entirely of steel and of grades best adapted to the different parts.

To get at the gearing of this Chuck take out the two small screws on opposite sides of nut, remove the sleeve, and the pinion gears can then be removed.

For instructions to take Chuck apart, cleaning, oiling, drilling hole through center, regarding accuracy see last four paragraphs referring to "New Model" Chuck above.

No.	List Price Each	Capacity Inch	Outside Diameter Inches	Length of Body Inches	Total Length of Jaws Extended Inches
21	\$14.00	0 to $\frac{1}{4}$	$1\frac{5}{8}$	$1\frac{1}{2}$	$2\frac{1}{2}$
22	16.00	0 to $\frac{3}{8}$	$2\frac{1}{4}$	$2\frac{3}{8}$	$2\frac{1}{4}$
23	22.00	0 to $\frac{1}{2}$	$2\frac{3}{4}$	$3\frac{1}{4}$	$4\frac{1}{4}$
24	40.00	$\frac{1}{4}$ to $\frac{3}{4}$	$3\frac{1}{2}$	$3\frac{3}{8}$	$5\frac{1}{8}$

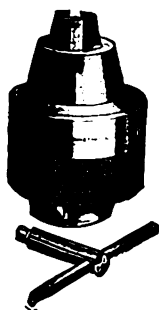


FIG. 656

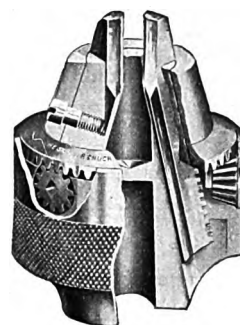


FIG. 658

SKINNER CENTER ARBORS FOR DRILL CHUCKS

Made of steel with hardened tang and ground true to gauge. We carry a complete stock of all Standard Taper and Straight Shank Arbors to fit every make and size Drill Chuck on the market.

MORSE TAPER ARBORS

To fit any size or make of Chuck

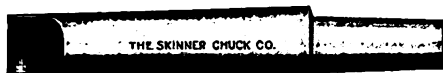


FIG. 657

Morse Taper Shanks No.	List Price
1	\$2.00
2	2.00
3	2.50
4	4.00
5	7.00

We also furnish Morse Taper Shank Arbors with end for Chuck left blank, to be fitted by customer.

PLAIN ARBOR WITH NUT, BLANK SHANK

$4\frac{1}{2}$ inches long, and $\frac{3}{4}$ inch or 1 inch diameter. Price on application.

We will be glad to quote prices on special arbors not listed above.

PLAIN ARBOR WITH BLANK SHANK

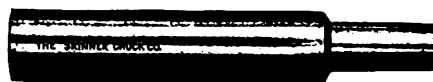


FIG. 660

$4\frac{1}{2}$ inches long, and $\frac{3}{4}$ or 1 inch diameter.

	List Price
Fitted to $\frac{1}{4}$ inch, $\frac{3}{8}$ inch and $\frac{1}{2}$ inch Drill Chucks	\$1.50
Fitted to $\frac{3}{4}$ inch Drill Chucks	2.00
Fitted to 1 inch Drill Chucks	2.50

ARBOR FOR BLACKSMITH DRILL PRESS



FIG. 661

With $\frac{1}{2}$ inch, or $\frac{3}{4}$ inch shank.

	List Price
Fitted to $\frac{1}{4}$ inch, $\frac{3}{8}$ inch, and $\frac{1}{2}$ inch Chuck	\$1.00
Fitted to $\frac{3}{4}$ inch Chuck	1.60
Fitted to 1 inch Chuck	2.50

NEW BRITAIN DRILL CHUCK

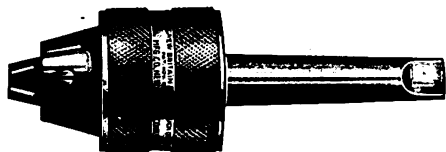


FIG. 665

These are positively hand operated chucks. The ball bearings reduce friction to a minimum, and there are no exposed gears or threads to become clogged or break. The chucks are also self-tightening and the harder the pressure on the drill, the tighter the grip of the jaws, lessening the possibility of the drill slipping, and adding to the life of the drill.

No.	Price Each	Cap.	Out-side Dia.	Depth of Taper	Diam. Large End	Taper per Foot
05	\$11.00	0 to $\frac{1}{16}$	$1\frac{1}{8}$	$\frac{5}{8}$	.386	$\frac{7}{8}$
06	11.00	0 to $\frac{1}{16}$	$1\frac{1}{8}$	$\frac{7}{8}$	.563	$\frac{7}{8}$
07	18.00	0 to $\frac{1}{16}$	$2\frac{1}{8}$	$1\frac{1}{4}$	.682	$\frac{5}{8}$
08	36.00	0 to $\frac{3}{4}$	$3\frac{1}{8}$	$1\frac{3}{4}$	.855	$\frac{5}{8}$
09	50.00	0 to 1	$4\frac{1}{8}$	$1\frac{3}{4}$	1.153	$\frac{5}{8}$

TAPER ARBORS

For Nos. 05 to 09 inclusive

No.	Price Each
No. 1 Morse Taper Shank.....	\$3.00
No. 2 Morse Taper Shank.....	3.00
No. 3 Morse Taper Shank.....	4.00
No. 4 Morse Taper Shank.....	4.00
No. 5 Morse Taper Shank.....	6.00

WEAVER ROLLER JAW DRILL CHUCK

Its extreme strength and simplicity of construction give this chuck the greatest possible durability. The holding power is automatic, and straight shank drills may be driven to the limit of their endurance without slipping or without injury to their shanks. The ease of operation, positive drive, small diameter and durable construction commends the chuck for every service. It is also essentially self-centering. As soon as the rolls are brought into contact with the drill shank the drill is automatically centered absolutely true.

With the Weaver roller jaw drill chuck you can adopt the strong and cheap straight shank system exclusively, and end broken tang trouble. It also gives you the cheapest and best means of using up broken tang taper shank drills.

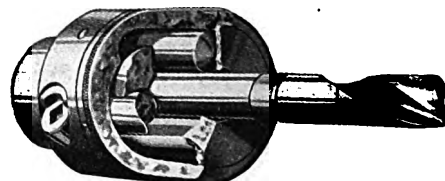


FIG. 663

No.	Price	Actual Capacity	Dia. Inches
0	\$16.00	($\frac{1}{16}$ - $\frac{17}{32}$)	$1\frac{1}{2}$
1	16.00	($\frac{7}{16}$ - $\frac{25}{32}$)	$1\frac{7}{8}$
2	22.00	($\frac{11}{16}$ - $\frac{31}{32}$)	$2\frac{1}{8}$
3	28.00	($\frac{13}{16}$ - $1\frac{1}{2}$)	$2\frac{3}{4}$

SPECIAL SIZES

No.	Price	Actual Capacity	Dia. Inches
$1\frac{1}{2}$	17.00	($\frac{11}{16}$ - $\frac{31}{32}$)	$1\frac{7}{8}$
$2\frac{1}{2}$	22.00	($\frac{13}{16}$ - $\frac{31}{32}$)	$2\frac{1}{8}$

TAPER ARBORS

For Nos. 0 to 3 inclusive

No.	Price Each
No. 1 Morse Taper Shank.....	\$2.00
No. 2 Morse Taper Shank.....	2.00
No. 3 Morse Taper Shank.....	2.80
No. 4 Morse Taper Shank.....	3.00

WESTCOTT LITTLE GIANT AUXILIARY SCREW DRILL CHUCK

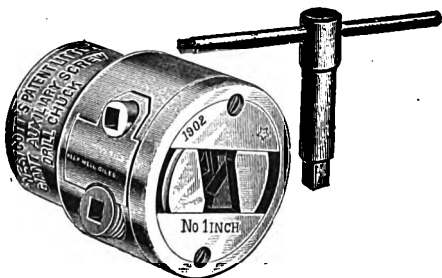


FIG. 662

In all drill chucks with side screws, the inner or gripping part of jaws has tendency to crowd away from the right and left hand screws, and the outer end of jaws has tendency to draw towards the right and left hand screws. The auxiliary screw (in this new Little Giant Auxiliary Screw Drill Chuck) entirely overcomes said tendencies.

After closing jaws on drill in the usual manner (by turning right hand and left hand screw) then tighten the auxiliary screw. This will greatly increase the gripping power of chuck. The effect of the auxiliary screw is similar to that of a bolt. It virtually bolts the two jaws together. The hole in the hub is made to fit the Morse taper but can be bored out and threaded to suit the customer's template at small cost. We can also furnish these chucks made with straight bodies, which are especially adapted to hollow spindle lathes, for holding rods, round or square, which are to be turned or cut off. When a chuck is wanted for holding square shank, it should be stated in order. Square V jaws will not hold down to nothing.

PRICE LIST

Size No.	List Price	Approximate Diameter	Capacity
$\frac{1}{2}$ in.	\$18.00	$2\frac{1}{4}$ in.	0 to $\frac{1}{2}$ in.
$\frac{3}{4}$ in.	20.00	3 in.	0 to $\frac{3}{4}$ in.
1 in.	22.00	$3\frac{1}{2}$ in.	0 to 1 in.
$1\frac{1}{4}$ in.	34.00	$4\frac{1}{8}$ in.	$\frac{1}{8}$ to $1\frac{1}{4}$ in.

WESTCOTT LITTLE GIANT IMPROVED AND DOUBLE GRIP CHUCKS

All improved and double grip drill chucks have the Westcott side screws, an auxiliary to help hold work where the strain is unusually heavy. After closing the jaws down upon the work, then, if doing heavy work, set up the independent screws. This gives double holding power. If user will flatten shank of drill slightly on each side, where side screw comes in contact with it, the chuck will then have a positive grip. In the No. 0 the screws reach $\frac{1}{8}$ inch, in the No. 1 to $\frac{1}{4}$ inch, in the Nos. 2 and $2\frac{1}{2}$ to $\frac{5}{8}$ inch. When using smaller drills the side screws must be drawn back out of the way to let the jaws pass.

These side screws are found to be valuable for holding taps by square part of shanks. Center the jaws on round part of shank in the usual way, and then set up side screws on square part.

IMPROVED

Taps can be held by the round part of the shanks, for tapping in tapping machines and in turret head machines.

For holding rough iron will furnish any of these Drill Chucks with the jaws serrated to order without extra charge. When Drill Chucks or jaws are wanted for holding square shank drills or taps, it should be so stated in the order. Jaws made with a square V will not hold down to nothing.

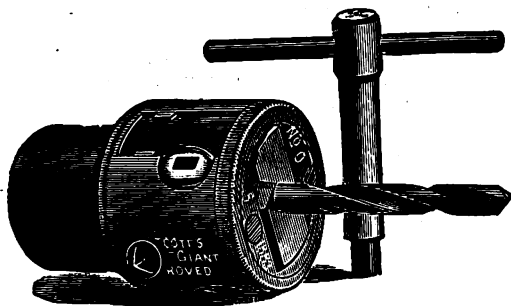


FIG. 662A

This Chuck has no projections. The jaws and screws are all within the body and are of the best tool steel, carefully hardened.

A guard ring prevents the jaws from being opened so as to take in larger work than the Chuck is designed for. It is very powerful, and is guaranteed to hold true. There is no shearing or bending of the drill in this Chuck. Each tooth of the jaw has an opposite to it, holding the drill firmly as in a vise.

There is no Chuck equal to it for holding wood boring tools. The hole in the hub is made to fit the Morse taper, but can be bored out and threaded to suit the customer's templet at small cost. The jaws are guided by two strong gibs, which prevent their canting when taking a short bite.

PRICE LIST

No.	Approximate Diameter	Holding Drills	List Price
00	$1\frac{1}{8}$ in.	0 to $\frac{1}{4}$ in.	\$16.00
0	$2\frac{1}{2}$ in.	0 to $\frac{1}{2}$ in.	18.00
1	3 in.	0 to $\frac{3}{4}$ in.	20.00
2	$3\frac{1}{2}$ in.	0 to 1 in.	22.00
$2\frac{1}{2}$	4 in.	0 to 1 in. ex. strong	24.00

DOUBLE GRIP

Many machinists demand a Drill Chuck with the grip so strong that a drill will break before it will slip.

Other machinists prefer the drill to slip instead of breaking.

The above different demands have been satisfied in the new "Double-Grip" Chuck here shown, by putting on a forged steel cap, which acts not only as a clamp, but, having flanges, becomes a tie plate, thus rendering it an impossibility to spread or spring the Chuck body.

This tie plate (or extra stay) applied to the back of the jaws is independent of their other adjustment. This is accomplished by said plate having lateral motion across the face of Chuck body, thereby doing away with the liability of throwing drills or work out of true. This Chuck will be found by far the best and most powerful Chuck made for use on bolt cutting machines and on screw machines for holding iron to be threaded with a die, or for any work where a Chuck of extra strength is needed, as well as for the many uses required of a Drill Chuck.

The "Double-Grip" Chuck can be used in the ordinary way without using the tie plate, but when it is used for extra heavy work, center the Chuck in the usual manner, then by setting up the set screw in the tie plate it will have many times the holding power of any Chuck manufactured. When the tie plate is used, the screws which hold same to face of Chuck should be eased a little so as to allow tie plate to move freely across face of Chuck.

By the use of this tie plate the heaviest of work can be done without injury to Chuck, i.e., without straining the screw that operates the jaws.

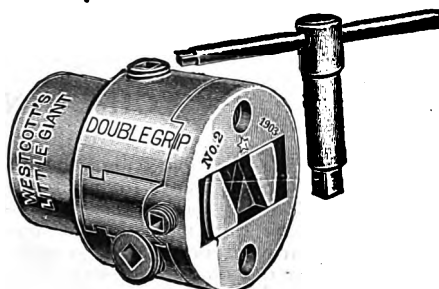


FIG. 662B

PRICE LIST

No.	Approx. Dia. In.	Holding Drills	Price List
0	$2\frac{1}{2}$	0 to $\frac{1}{2}$ in.	\$18.00
1	3	0 to $\frac{3}{4}$ in.	20.00
2	$3\frac{1}{2}$	0 to 1 in.	22.00
$2\frac{1}{2}$	4	0 to 1 in; ex. strong	24.00

ARBORS FOR LITTLE GIANT CHUCKS

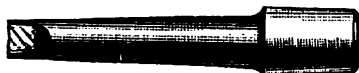


FIG. 664

With Morse Taper Shank, fitted to any size Little Giant Chuck.

Number.....	1	2	3	4	5
Each.....	\$2.00	2.50	2.50	4.00	5.00

QUICK ACTION DRILL CHUCKS



FIG. 667



TYPE A COLLET—FIG. 669

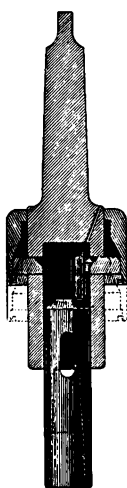


FIG. 668

PRICE LIST OF QUICK ACTION CHUCKS AND COLLETS

Number of Chuck.....	2	4	6
Largest Size Drill to be Used in Chuck.....	1"	1½"	2"
Morse Taper Shank of Chuck..	2-3-4	4-5	5-6
Largest Diameter of Chuck....	2½"	3½"	4½"
Weight of Chuck.....	3 lbs.	7 lbs.	12 lbs.
Price, each of Chucks.....	\$14.00	\$24.00	\$36.00

QUICK ACTION TYPE (A) COLLETS FOR MORSE TAPER SHANK TOOLS

Number of Collet.....	2	4	6
Morse Taper Shank Capacity..	1-2	2-3-4	2-3-4-5
Outside Diameter of Collet....	1"	1¾"	2½"
Price, each.....	\$3.00	\$7.00	\$12.00

The QUICK ACTION CHUCK with its perfect mechanical design and construction affords the operator the opportunity of interchanging rotative tools while the spindle of the machine continues to revolve, thus saving time and increasing the production.

All that is necessary for the operator to do when he wishes to change the tool is simply raise the collar a short distance and the collet can be readily ejected from the chuck housing and another collet can be inserted into its place, and by lowering the collar the collet is positively locked in its place ready for operation, which consumes only a few seconds.

The design and mechanical construction that is embodied in this chuck eliminates all back lash and longitudinal play, which gives the driven tool a positive driving torque, thus no breakage of drills, taps, reamers or other tools is encountered.

There are no small delicate parts embodied in the construction of this chuck, as each and every piece has unlimited strength and durability.

The QUICK ACTION CHUCK is constructed from solid bar stock of the best crucible steel and is equipped with standard taper shank. Two slots are located in the upper portion of the chuck into which two hardened tool steel pawls are placed, and these are held in a position by a collar with a ninety degree face which is tangent to a sixty degree face which guides the pawls in contact with a ninety degree face where these driving members are held in a positive driving position.

QUICK ACTION TYPE (B) COLLETS IN BLANK FORM

Number of Collet.....	2	4	6
Largest Diameter of Collet....	1½"	2½"	2½"
Length of Collet Body.....	1½"	1½"	2½"
Price, each.....	\$4.00	\$6.00	\$9.00

QUICK ACTION TYPE (B) COLLET IN FINISHED FORM

Price, each.....	\$6.00	\$10.00	\$14.00
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CINCINNATI TAPPING CHUCK

Designed to facilitate the operation of tapping in either a horizontal, upright or radial drill. Besides affording a convenient means for holding taps, it economizes in power, avoids the stripping of threads—thereby eliminating the need for a positive lead mechanism—and permits driving in a machine of fixed capacity taps much larger than could otherwise be used. These many desirable characteristics owe their existence to the recognition of the single fundamental fact that less power is required to slide a sleeve driven by ball bearing keys than a spindle driven by an ordinary key.

Made in two sizes, each of which is fitted with either a No. 4 or No. 5 Morse taper shank. The No. 1 drives taps up to 4 inches in diameter while the No. 2 is designed for operating one as large as 6 inches. One tap-holder only accompanies a chuck, but it is bored and squared to any dimensions the customer elects, the idea being that each user will either reduce all his shanks to one size or make for himself such additional holders as he may wish. The chuck is made throughout of alloy steel of high tensile strength. Both the sleeve and ball bearing parts are hardened and all of its cylindrical pieces are finished by grinding.

Chuck Number.....	1		2	
Size of Morse Taper Shank No.	4	5	4	5
Size of Pipe Tap Chuck is adapted to drive, inches.....	4	4	6	6
Width of driving lugs, inches.....	7/8	7/8	1½	1½
Length of sleeve movement, inches.....	2½	2½	3	3
Weight, pounds.....	23	23	31	31
Price, each.....				

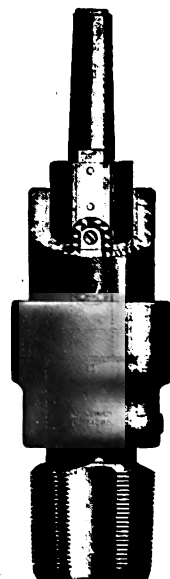


FIG. 3983

ERRINGTON AUTO-REVERSE TAPPING CHUCKS

REQUIRE NO REVERSE ON DRILL PRESS

Errington Auto-Reverse Tapping Chuck requires no reversing mechanism on the drill press, as it drives the tap in, stops automatically, and backs the tap out with quick return by simply raising the drill spindle. The different styles are secured by inserting any one of the Duplex Tap-Chucks desired, without changing the very simple Steel Spur Quick-Reverse Gear.

Specify Style B, where the work is drilled and then re-handled and tapped.

Specify Style C, for tapping steel, copper, etc., wherever there is danger of breaking taps.

Specify Style D to drill, tap and stud, etc., without moving work or stopping the machine.

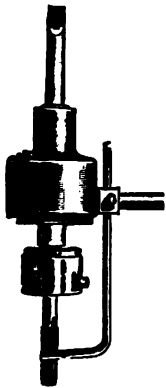


FIG. 676

STYLE B

POSITIVE TAP-HOLDER AND STOP

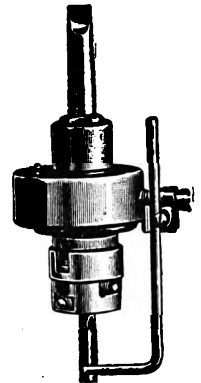


FIG. 676

STYLE C

FRICION TAP-HOLDER AND STOP

Size	Taps Inches	Morse Taper Shank	Style B. Positive Tap-Holder and Stop	Style C. Friction Tap-Holder and Stop.	Style D. Friction changeable Drill and Tap-Holder	Stud-setter Fitted to D & E.
No. 00	$\frac{1}{16}$ — $\frac{3}{8}$	No. 1, 2, 3	\$ 50.00	\$ 60.00	.....	.....
" 0	$\frac{1}{8}$ — $\frac{5}{8}$	" 3, 2, (1*)	60.00	70.00	.....	.....
" 1	$\frac{1}{4}$ — $\frac{3}{4}$	" 3, 4	63.35	80.00	\$110.00	\$25.00
" 2	$\frac{5}{16}$ —1	" 4, 5, (3*)	80.00	100.00	130.00	30.00
" 3	$\frac{3}{8}$ — $1\frac{1}{4}$	" 4, 5, (3*)	100.00	120.00	150.00	35.00
" 4	$\frac{1}{2}$ — $1\frac{1}{2}$	" 5, 4	140.00	160.00	180.00	40.00
" 5	$1\frac{1}{2}$ —2	" 5, (4*)	160.00	180.00	200.00	45.00

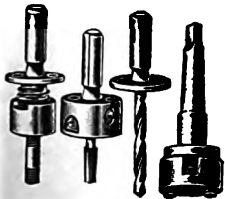
The first size of Morse Taper Shank given above for each size is the one regularly furnished, the other sizes can be furnished, but the size marked (*) is too small to be used unless it is re-enforced by a set-screw.

Extra Drill-Holder for No. 1	Styles D & E has No. 1 Morse Taper Socket	\$12.55
" " " No. 2	" " " No. 2 " " "	16.00
" " " No. 3 & 4	" " " No. 3 " " "	20.00
" " " No. 5	" " " No. 4 " " "	36.00
Special " " No. 2	" " " No. 3 " " "	24.00
" " " No. 3 & 4	" " " No. 4 " " "	36.00

Extra Tap-Holders for Styles D & E are listed the same as Style F Duplex Tap-Chucks.

ERRINGTON DUPLEX SELF-CENTERING TAP-CHUCKS

FOR REVERSIBLE DRILL PRESSES, TAPPING MACHINES, ETC.



STYLE E. FIG 677

**FRICION—INTERCHANGEABLE DRILL AND
TAP HOLDER
(Stud-Setter Extra)**

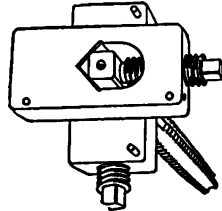


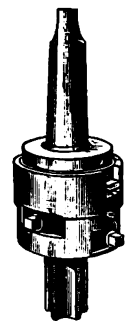
FIG. 678

THE DUPLEX GRIP



STYLE F. FIG 679

POSTIVE TAP HOLDER



STYLE G, FIG 680

FRICION TAP HOLDER

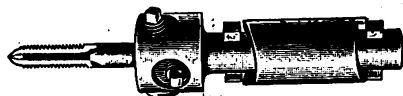
Size	Taps Inch	Morse Taper Shank	Style E. Interchangeable Drill and Tap-Holder	Stud-setter fitted to Style E	Style F Positive Tap- Holder	Style G. Friction Tap- Holder
No. 00	$\frac{1}{16}$ — $\frac{3}{8}$	No. 1, 2, 3	.....	.....	\$12.00	\$20.00
" 0	$\frac{1}{8}$ — $\frac{5}{8}$	" 3, 2, (1*)	.....	.....	18.00	30.00
" 1	$\frac{1}{4}$ — $\frac{3}{4}$	" 3, 4	\$ 80.00	\$25.00	25.00	40.00
" 2	$\frac{5}{16}$ —1	" 4, 3, 5	100.00	30.00	30.00	45.00
" 3	$\frac{3}{8}$ —1 $\frac{1}{4}$	" 4, 5	120.00	35.00	35.00	43.35
" 4	$\frac{1}{2}$ —1 $\frac{1}{2}$	" 5, 4	140.00	40.00	40.00	55.00
" 5	$\frac{1}{2}$ —2	" 5	160.00	45.00	50.00	60.00

ERRINGTON DUPLEX SELF-CENTERING TAP-CHUCKS

FOR TURRET LATHES



STYLE G-H. FIG. 681



STYLE F-H. FIG. 684
POSITIVE WITH DOUBLE CLUTCH SLEEVE

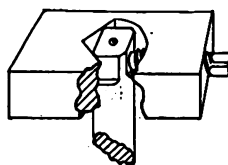


FIG. 682



STYLE G-I. FIG. 683

FRICTION SELF-CENTERING DUPLEX CHUCK
WITH DOUBLE CLUTCH SLEEVE

THE DUPLEX GRIP

INTERCHANGEABLE FRICTION
WITH SPLINED SLEEVE

Size No.	00	0	1	2	3	4	5
Price, Style F-H.....each	\$22.00	\$28.00	\$35.00	\$40.00	\$45.00	\$50.00	\$60.00
Price, Style G-H or G-I....."	30.00	40.00	50.00	55.00	60.00	65.00	70.00

The Duplex Tap-Holder is self-centering; to universal dogs, placed one above the other, center the tool with the direct pressure of two set screws against wide V surfaces.

The only adjustable Positive-Drive Chuck.

Grip Square Head of Tap in Upper Jaw with Flat against end of Upper Screw, then tighten up Lower Jaw on Round Shank (Fig. 678.) Round part of shank must not reach up past the end of the upper screw. (Fig. 682.)

This Duplex Grip is unequalled by any other Chuck.

HOEFER AUXILIARY DRILLING HEADS

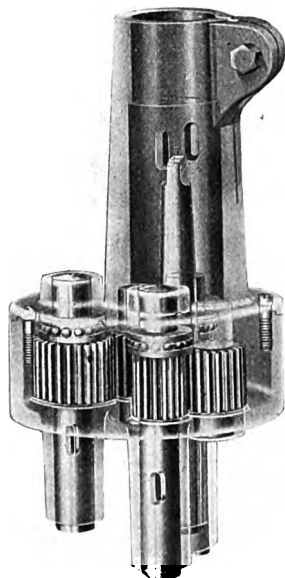


FIG. 3989

Greater economy in drilling can be obtained by the use of these auxiliary drilling heads, for it is possible to drill the number of holes for which the head is designed in the time required for one hole with a single drill.

The cut shows but one kind, it being impossible to show all the designs. All the gears are cut integral with their spindles and are encased in an oil-proof case. These spindles are made of a high grade crucible steel, accurately ground and fitted with a ball thrust bearing. In fact every means possible is used to make the heads durable and to maintain their accuracy.

The head has been designed with a long sleeve which is clamped securely on the sleeve of the spindle. This does away entirely with the arm to keep the head from turning, which is common to other heads on the market, and secures greater rigidity preventing the breakage of drills. It is also capable of more accurate work because of this rigidity.

The application of these drilling heads to work for which they are adapted means the reduction of cost of production.

Send blue prints or sketch with inquiry showing number, sizes and center distances of holes to be drilled.

Send for our special Auxiliary Head catalog.

DRILL SPEEDERS OR HIGH SPEED DRILLING ATTACHMENTS

THE CINCINNATI

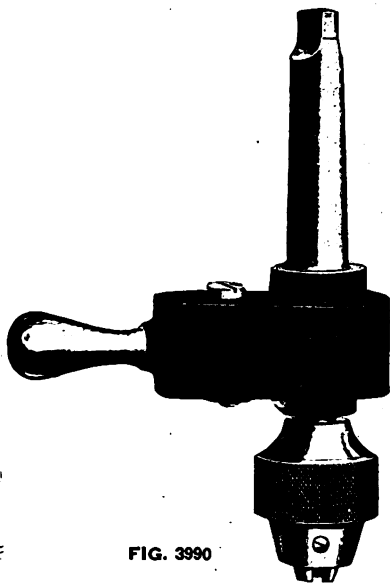


FIG. 3990

Few, if any, of the larger sizes of standard upright, radial or horizontal drilling machines are provided with a sufficiently high speed to permit drilling economically holes less than $\frac{3}{8}$ of an inch in diameter. The drilling of oil or other small holes in such machines consumes, therefore, just as much time as is required to drill considerably larger ones which in these times of keen competition can hardly be considered good practice.

This High Speed Attachment minimizes this loss by transmitting to the drill proper over twice the speed imparted to it by the spindle of the machine. Inasmuch as doubling the speed of a drill halves the time consumed in attaining any fixed depth, the productiveness of a heavy tool engaged upon light work may, through the use of this device, be greatly augmented and this represents but a portion of its usefulness as the attachment has proved equally efficacious for centering work in a lathe as well as for performing many drilling operations in milling machines and other tools having a rotary spindle.

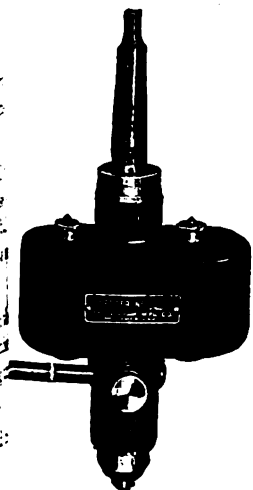
Made in two sizes, the smaller of which is fitted with a No. 3 Morse taper shank and receives drills from 0 to $\frac{1}{8}$ inch in diameter while the larger one has a No. 4 Morse taper shank and is adapted to driving drills from 0 to $\frac{3}{4}$ inch in diameter. The chuck is furnished by us or left to the selection of the customer as he may elect.

How Furnished.....	Without Chuck		With Chuck	
Size of Attachment, No.	1	2	1	2
Size of Morse Taper shank, No.	3	4	3	4
Size of drills chuck receives, inches.	0 to $\frac{1}{8}$	0 to $\frac{3}{4}$	0 to $\frac{1}{8}$	0 to $\frac{3}{4}$
Ratio of increase in speed.	1 to 2.09	1 to 2.14	1 to 2.09	1 to 2.14
Weight, lbs., without chuck.	3 $\frac{3}{4}$	3 $\frac{3}{4}$	11 $\frac{1}{4}$	11 $\frac{1}{4}$
Price, each. ....	.....	.....	.....	.....

GRAHAM

The purpose of these machines is to increase the speed of small drills while being used in the larger class of drill presses—say from 20-inch to largest radial.

All sizes increase the Speed Three Times. No. 2-L has a sensitive Feed Lever giving rack traverse of $1\frac{1}{4}$ -inch and is intended for rather light drilling, such as Template making, Toolmaker's use, Dowel Pins, Oil Holes, etc. All others are operated by the feed mechanism of the Main Machine.



STYLES NOS. 2, 3 AND 4,
FIG. 96

No.	Price
2, with Chuck for drills up to $\frac{1}{8}$ "; Shank No. 2 Morse, length without Shank and Chuck 5 $\frac{1}{2}$ ".....	\$40.00
3, with Chuck for drills up to $\frac{1}{2}$ "; Shank No. 3 Morse, length without Shank and Chuck 6".....	44.00
3B, with No. 1 Morse Hole in Spindle instead of Chuck; Shank No. 3 Morse, length without Shank and Spindle Taper 6".....	44.00
4, with Chuck for drills up to $\frac{3}{4}$ "; Shank No. 4 Morse, length without Shank and Chuck, 6 $\frac{3}{4}$ ".....	64.00
4B, with No. 2 Morse Hole in Spindle instead of Chuck; Shank No. 4 Morse, length without Shank and Spindle Taper, 6 $\frac{3}{4}$ ".....	53.00
2L, with Chuck for drills up to $\frac{3}{8}$ "; Shank No. 3 Morse, length without Shank and Chuck, 5 $\frac{3}{4}$ ".....	53.00



STYLE NOS. 3-B AND 4-B,
FIG. 3991

To increase the size of Shanks, use short sockets or sleeves: No. 2 to No. 3, \$1.85; No. 2 to No. 4, \$2.35; No. 4, \$2.35; No. 4 to No. 5, \$3.40; No. 4 to No. 5, \$3.40.

Without the use of Sleeves, Nos. 2, 2L, 3 and 3B cannot have over No. 3 Morse Taper Shank. Nos. 4 and 4B cannot have over No. 4 Morse Taper Shank.

SKINNER DRILL PRESS VISE

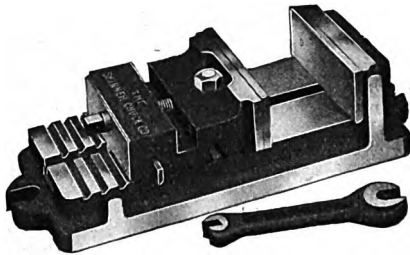


FIG. 686

Size No.	Width Jaw, Inches	Depth Jaw, Inches	Jaws Open, Inches	Approx. Ship. Weight, Lbs.	Space required Inches	Price Each
2½	2½	1	2½	4¼	6x2½	\$15.00
3½	3½	1⅝	4¾	12	9⅝x4⅛	18.00
4½	4½	2	5	37	14x5¼	22.50
5½	5½	2	6	43	15x6	27.00
7½	7½	2½	9	98	19¾x9	45.00

This Vise is designed for holding work on a drill table. It is similar in construction to the Skinner Planer Chuck, but more portable and convenient for use on a drill. It can also be used to advantage on Planers, Shapers, Milling Machines, etc.

It is a very handy tool to have in the machine shop.

BODY is a carefully machined and highly finished casting, provided with lugs on side so vise may be used at right angles,

JAWS are of good proportion with steel faces. "V" grooves can be cut in these jaws for holding round work. Instant adjustment can be made of jaws from 0 to greatest capacity. Either straight or taper work can be held.

Set screw and holding strip of crucible steel, and set screws and nuts hardened.

A case hardened forged steel wrench is furnished with each vise.

Bolted to drill, planer, miller or shaper by ears at both ends of vise. Vise also has flange on all sides for clamping.

GRAHAM DRILL PRESS VISE

WITH OR WITHOUT JIG ATTACHMENT

Most Drilling Jigs consist of three parts: 1. A Clamping Device. 2. A Guide for the Drill. 3. Stops to keep the work in position.

The Vise as shown in Fig. 685 provides all these as well as a suitable base upon which to fasten the fixtures to suit your special work.

It is a small Jig that will not cost more than the Vise and Fixtures.

It holds work for drilling the same as an ordinary drill vise.

In addition it holds it so that duplicate parts may be clamped in exactly the same position each time.

It saves the making of expensive drilling jigs, because the jig attachment enables you to drill each piece as accurately as it could be done in a special jig.

As a base upon which to fasten plates with several bushings—special jaw and fixtures—thereby saving extravagant jigs—it has filled a long felt want.

This idea, followed out by an intelligent man, will prove this vise to be one of the most valuable tools in the machine shop.

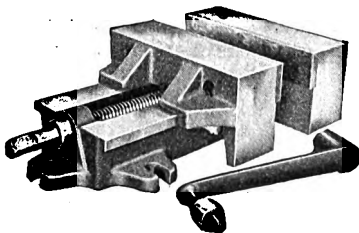
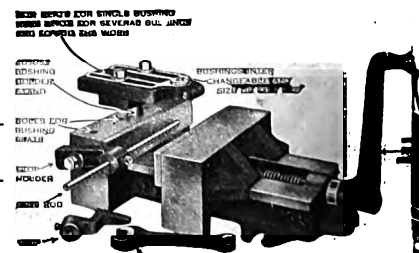


FIG. 3992

WITHOUT JIG ATTACHMENTS

MADE IN THREE SIZES

			Price	
		Will Open	Weight	
No. 3	Jaws 6 in. long, 1½ in. deep...	4½ inch	32 lbs.	\$34.00
No. 4	Jaws 9 in. long, 2 in. deep...	7 inch	65 lbs.	44.00
No. 5	Jaws 12 in. long, 2½ in. deep...	9½ inch	135 lbs.	66.00
			Without Jig Att.	With Jig Att.
			\$38.00	\$49.00
			73.00	



WITH JIG ATTACHMENT—FIG. 685

THE ARMSTRONG QUICK ACTION DRILL VISE

AN EXTREMELY HANDY VISE FOR TOOL MAKERS AND GENERAL MACHINE SHOP USE. MADE IN THREE SIZES.

One turn of handle sets or releases the vise. It can be instantly adjusted to any size within its capacity. The sides are ground true and at right angles with the bottom. It will hold work true and solid, as the sliding jaw draws down.

The handle provides a safe and convenient means of holding light work with ample leverage against the tendency to twist under strain of cut, and bottom of vise has projecting lugs at either end to facilitate clamping it to the machine when desirable

PRICE LIST

No.	Capacity			Weight	Price Each
	Width of Jaw	Depth of Jaw	Opens		
1-V	2 in.	$\frac{1}{8}$ in.	$1\frac{3}{4}$ in.	$4\frac{1}{2}$ lbs	\$6.00
2-V	$2\frac{3}{4}$ "	$1\frac{3}{8}$ "	$2\frac{1}{2}$ "	$8\frac{1}{2}$ "	9.00
3-V	$3\frac{1}{2}$ "	$1\frac{1}{4}$ "	3 "	16 "	14.00

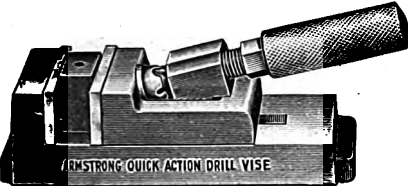


FIG. 691

BRIGHTMAN DRILL PRESS OR MILLING MACHINE VISE

The Handy Drill Press Chuck, or Milling Machine Vise, is a tool that will be found indispensable. There is no blocking required for holding work in any position or angle.

It can be bolted to any ordinary drill press or milling machine table, and work held perfectly secure. The saving of time, drills and cutters is an object today worthy of consideration.

The two clamping screws will hold it rigid at any desired point.

Opening of Jaw	Length of Jaw	Depth of Jaw	Weight	Price
6 inches	6 inches	2 inches	60 lbs.	\$47.00

For special work can be made up to 12 inches square.

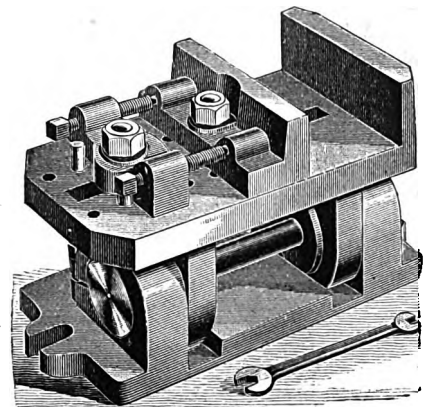


FIG. 688

CINCINNATI DRILL PRESS VISE

The most convenient and useful vise for drill press, milling machine, shaper and planer to be obtained. This vise is made in three sizes, as per dimensions given below and will hold flat, round, straight or taper work equally well, adjusting itself to the shape of the work, holding it securely in the most practical manner. The workmanship and finish of this vise is second to none and will be much appreciated by good mechanics.

DIMENSIONS

NUMBER	2	3	4
Width of jaw.....	$4\frac{3}{4}$ "	6 "	$7\frac{1}{2}$ "
Depth of jaw.....	$1\frac{1}{4}$ "	$1\frac{1}{8}$ "	$2\frac{1}{8}$ "
Opens with both blocks in place.....	$1\frac{5}{8}$ "	2 "	$3\frac{1}{2}$ "
Opens with one block removed.....	3 "	4 "	$5\frac{1}{8}$ "
Opens with both blocks removed.....	$4\frac{1}{2}$ "	6 "	$8\frac{1}{4}$ "
Weight, lbs.....	30	45	90
Price.....			

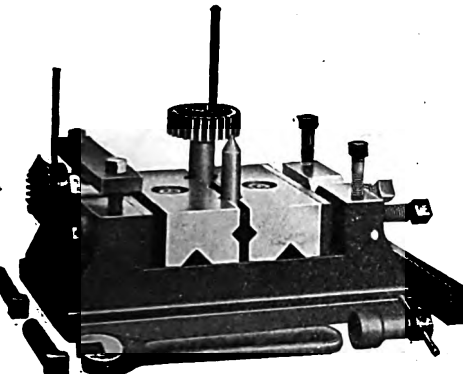


FIG. 687

YANKEE VISES**NO. 990****FIG. 695**

This Vise is designed for use on "Yankee" Bench Drills, or separately attached to bench. The body and sliding jaw are of cast iron, accurately machined to hold work square, when used either flat or on side. The sliding jaw has a T-shaped slot $\frac{1}{8}$ inch wide, insuring parallel movement of jaw. A removable swivel jaw is provided to hold taper work, and is made of steel, case hardened. The stem has a friction spring to hold jaw in position.

The base of vise is 6 in. long and $2\frac{3}{8}$ in. wide. Extreme height 2 in. The opening of jaws, without swivel jaw, is 3 in., with swivel jaw $2\frac{5}{8}$ in. Depth of jaws $1\frac{3}{8}$ in. Weight of vise 4 lbs.

Price.....Each, \$3.35

NO. 993

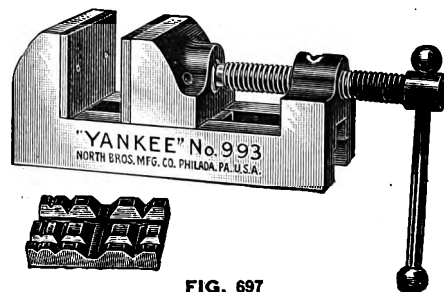
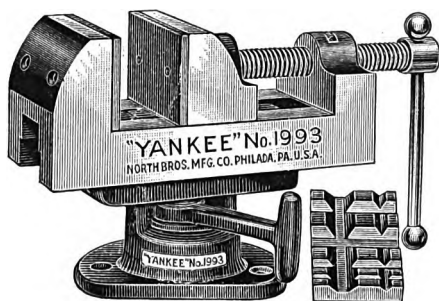
This is similar in design to the "YANKEE" Vise No. 990 but of larger capacity, and for use in holding work to be machined. It can be used not only on base, but on either side or even on end.

The screw is of steel $\frac{5}{8}$ inch in diameter, with Acme thread. The head on end is $1\frac{1}{8}$ inch diameter to receive sliding bar, made of $\frac{1}{8}$ inch diameter steel and is $4\frac{1}{2}$ inches long.

A hardened steel block is provided with V-shaped grooves of various sizes for holding round or irregular shaped work in drilling, shaping, etc.

The base of Vise is $7\frac{1}{4}$ inches long, $2\frac{3}{4}$ inches wide; extreme height is 3 inches. The jaws are $2\frac{3}{4}$ inches wide, $1\frac{1}{8}$ inches deep, and open $3\frac{3}{8}$ inches. Weight of Vise, $9\frac{1}{4}$ lbs.

Price.....Each, \$6.50

**FIG. 697****FIG. 696****NO. 1993**

This is the No. 993 "YANKEE" Vise mounted on Swivel Base for use on Bench, and its upper part (No. 993) quickly detachable for use on Drill Press, Shaper, etc., and putting back again on Swivel Base.

The Base is $4\frac{1}{2}$ inches in diameter, has three bosses on under side to give a level bearing on bench.

The upper part of Swivel has a taper piece to receive taper end of sliding jaw with set screw in one end to force taper into position, thus clamping Vise and Base perfectly rigid. Weight 15 lbs.

Price, complete.....Each, \$9.00

Extra Bases.....Each, 3.00

STARRETT PIN VISES**NO. 162****FIG. 729**

These vises have hardened jaws with chucks so made that they will hold firmly anything inserted in them. The hole extends through full length of the handle.

The handle is reduced in size, so that it may be more rapidly rotated between thumb and finger when filing small work. They are convenient handles for holding scribers, small files, etc. Nickel plated.

PRICES

No. 162A	.00 inch to .040 inch.....	\$0.50
No. 162B	.030 inch to .062 inch.....	.50
No. 162C	.050 inch to .125 inch.....	.50
No. 162D	.115 inch to .187 inch.....	.50
Set complete (one of each size)	.....	2.40



NO. 96—FIG. 724

HAND VISES

NO. 96

Provided with parallel Jaws, a form of construction that greatly increases the convenience and utility of the tool.

Jaws are drop forged from steel bars. The Jaw Faces are scored and case hardened, are $1\frac{1}{4}$ inches long and $\frac{3}{8}$ inch wide. They will open $1\frac{1}{8}$ inches and are always parallel whether open or closed.

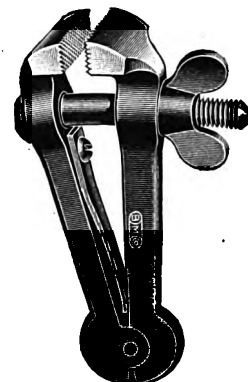
The tool is finished entirely in black except the edges of the Jaws, which are polished. Length, $4\frac{1}{2}$ inches. Net weight, 12 ounces.

Priceeach \$2.70

NO. 80

Cast Steel Jaws Milled and Hardened. Carbon Finish with face of jaws polished.

Length over all, inches.....	$3\frac{1}{2}$	$4\frac{1}{4}$	5	$5\frac{1}{2}$	6
Opens, inch.....	$\frac{1}{2}$	$\frac{3}{4}$	$\frac{7}{8}$	1	$1\frac{1}{8}$
Price each.....	\$0.75	\$0.80	\$0.90	\$1.00	\$1.25



NO. 80—FIG. 725

GOODSELL-PRATT VISES

BENCH NO. 168

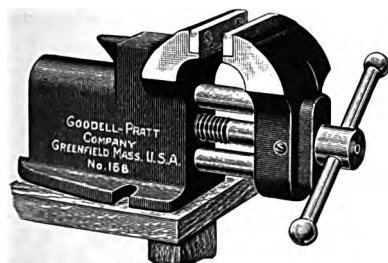


FIG. 698

This is an excellent Bench Vise of medium size. The steel Feed Screw and two $\frac{1}{2}$ -inch steel Guide Rods give it rigidity and the careful fitting makes it work smoothly and grip tightly. The special thread on the Feed Screw was designed to give it great strength.

The Jaw Faces are made of a very tough steel, $2\frac{1}{2} \times \frac{3}{4}$ inch. They are scored and case hardened. The taper-headed Screws by which the Jaws are fastened to the Vise will take up any looseness. Jaws open $2\frac{1}{2}$ inches.

Iron parts are finished in red and black enamel; steel parts are polished.

Weight 11 pounds, price, each.....\$6.50

MECHANICS'—NOS. 370 AND 523

These Vises are designed to be stronger and more rigid than such tools are usually made, in order that they will stand the hard usage generally given them in machine shops.

The Jaws are peculiarly shaped to give them great strength and the two $1\frac{1}{8}$ -inch steel Guide Rods and the large steel Feed Screw with a special square thread give it rigidity. The Jaw Faces are made of very tough steel scored and case hardened. They are fastened in place by taper-headed screws that will readily take up any looseness.

All iron parts are finished in red and black enamel; steel parts are polished.

No. 370. Jaw Faces, $3 \times 1\frac{1}{4}$ inches. Jaws open $4\frac{1}{8}$ inches. Net weight, 40 pounds. Price, each.....\$14.00

No. 523. Jaw Faces, $3\frac{1}{2} \times 1\frac{1}{4}$ inches. Jaws open $4\frac{1}{8}$ inches. Net weight, 41 pounds. Price, each.....\$15.00

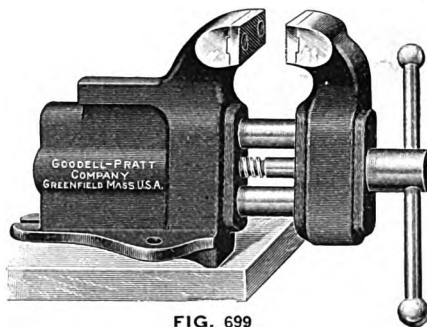


FIG. 699

VICTOR "JERSEY" VISES

CLAMP BASE, HARDENED TOOL STEEL JAWS

Victor "Jersey" Vises are strong, serviceable tools, and have long been popular with both mechanics and amateurs. The Screw (body, head and collar) is in one piece, turned from cold rolled steel, and has a square, lathe-cut thread. The steel jaws are hardened, and all jaws are ground to insure that they meet squarely when tightened. Both back and front jaws are filed to a fit.

No. 764. Width of jaws $2\frac{1}{4}$ inches, weight 4 lbs. Price, each.....\$1.55

No. 766 Width of jaws 3 inches, weight $8\frac{3}{4}$ lbs. Price, each.....2.50

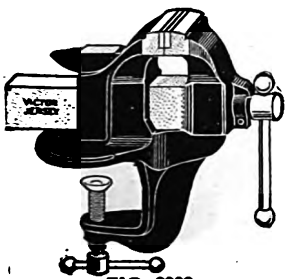


FIG. 3993

PARKER VISES

PARKER REINFORCED SLIDE

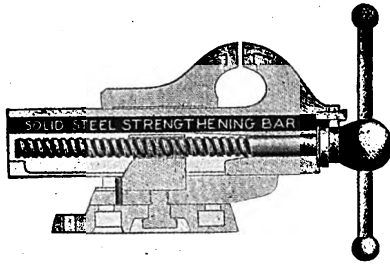


FIG. 700

under portion on front jaw, which is open in other vises, adds materially to the strength, as does also the one-piece collar and vise screw. As will be noted from illustration, base "A" is designed with recess to receive expansion ring "B", also has hole in center to receive bolt "D" which is screwed into threaded hole in center of vise flange. The duty of this bolt is to hold base to vise. The expansion ring "B" is split at one side with wedge shape opening to receive steel wedge "C", and on the other side has a stud "E" perpendicular to face of ring; this stud serving the double duty of keeping the dirt out of recess in base and also centering the wedge "C" in position to receive draw bolt "F". This bolt "F" is operated by small lever on top of vise flange, which turns bolt into wedge "C"; the wedge is drawn up, expanding the ring "B" against the wall of the base "A", forming a positive grip. This swivel can be operated either from the right or left side of vise by turning out the center bolt "D", lifting vise off base and turning the ring "B" around so that the stud "E" enters the hole on the opposite side, then put the draw bolt "F" in hole and turn into wedge "C" after securing base to vise with center bolt "D".

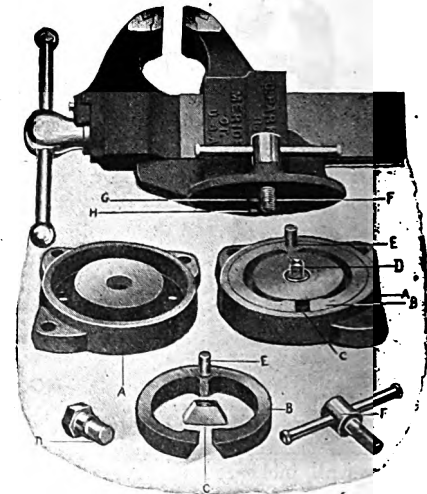


FIG. 701

ECLIPSE MACHINISTS'

The steel faces are milled and fitted to the jaws and are renewable. A cut thread—set screw and nut—spindle and spindle screw to take up lost motion. Set screw and spring tension on lever to hold same in position.

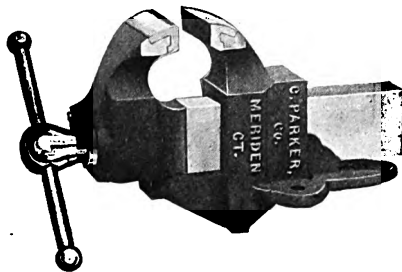


FIG. 706

STATIONARY BOTTOM

Number.....	101	102	103	104	105	106	106½	107
Width of jaws, in.....	2½	3	3½	4	4½	5	5½	6
Jaws open, in.....	3½	4½	5½	6½	7	8	9	10½
Weight, lbs.....	14	22	35	43	61	83	105	132
Price, each.....	\$9.00	10.00	11.25	12.75	15.50	20.00	30.00	39.00

SWIVEL BOTTOM

Number.....	201	202	203	204	205	206	206½	207
Width of jaws, in.....	2½	3	3½	4	4½	5	5½	6
Jaws open, in.....	3½	4½	5½	6½	7	8	9	10½
Weight, lbs.....	16½	25	41	57	75	104	125	157
Price, each.....	\$12.00	13.00	15.00	17.00	20.00	30.00	38.00	52.00

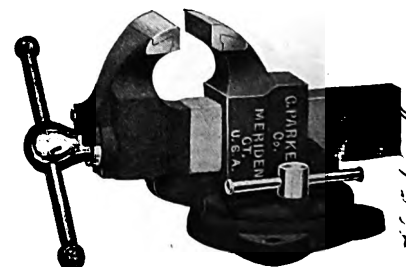


FIG. 707

PARKER VISES

SUPERIOR MACHINIST'S

SEMI-STEEL

The castings are of semi-steel and the slide is strengthened with the patented solid steel bar. Has an extra large cut screw and nut. The faces are of a special tool steel and are milled and fitted to the jaws. They are treated by a special process of hardening and are renewable. A set screw and spring tension on the lever are placed at the head of the screw. This holds lever at any position desired and saves injuries caused by the dropping of the lever.



FIG. 702

STATIONARY BOTTOM

Number.....	29	39	49	59	69	79	79½
Width of Jaws.....inches	3¼	3¾	4¼	4¾	5½	6¼	7
Jaws open....."	4	6	7	8	9	9½	10½
Weight.....pounds	32	49	66	83	125	150	190
Price.....each	\$11.50	13.00	17.00	22.00	30.00	45.00	55.00

SWIVEL BOTTOM

Number.....	229	239	249	259	269	279	279½
Width of Jaws, in.....	3¼	3¾	4¼	4¾	5½	6¼	7
Jaws open, in.....	4	6	7	8	9	9½	10½
Weight, pounds.....	36	56	78	96	148	184	220
Price, each.....	\$13.50	17.00	21.00	27.50	38.50	55.00	67.50

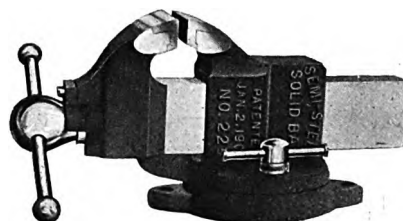


FIG. 703

VICTOR SWIVEL JAW MACHINIST'S

SEMI-STEEL

These vises have semi-steel castings, solid steel bar reinforced slide, finely tempered tool steel renewable faces, strong clean cut screw and nut, saddle and saddle screw features, set screw and spring tension on lever. All parts interchangeable and renewable. By removing the pin from the back jaw, it will swivel so that the jaws will grip firmly any taper or irregularly shaped piece.

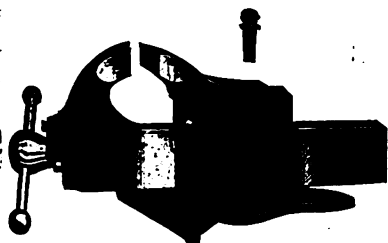


FIG. 704

STATIONARY BOTTOM

Number.....	370	371	371½	372	373	374	375	340
Width of Jaws, in....	3	3½	4	4½	5	5½	6	7
Jaws Open, in.	3½	5	5	6	7	9	9½	11
Weight, pounds.....	25	40	41	59	73	99	149	189
Price, each.....	\$15.00	16.00	19.00	22.00	28.00	35.00	50.00	65.00

SWIVEL BOTTOM

Number.....	270	271	271½	272	273	274	275	240
Width of Jaws, inches	3	3½	4	4½	5	5½	6	7
Jaws Open....."	3½	5	5	6	7	9	9½	11
Weight.....pounds	33	51	52	70½	85	123	174	222
Price.....each	\$17.50	20.00	24.00	28.00	35.00	44.00	60.00	75.00

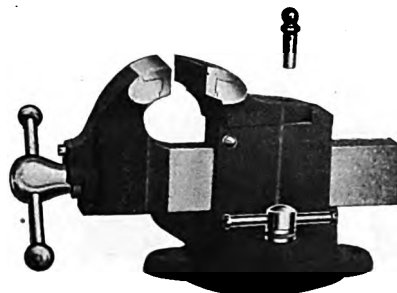


FIG. 705

PARKER VISES

SUPERIOR COMBINATION PIPE

SWIVEL BOTTOM SEMI-STEEL

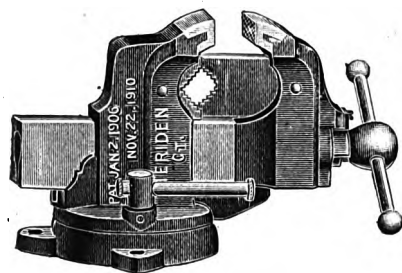
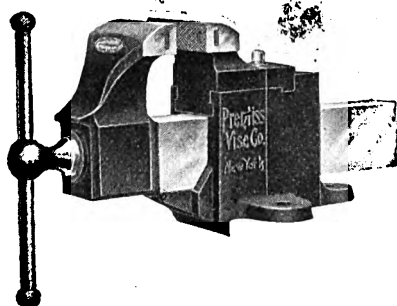


FIG. 709

This vise has the Parker patented swivel base with its positive locking device which gives additional strength. It adds support and stability over the old style swivel and is a decided improvement to this vise. Has extra strong clean cut thread screws and nuts, saddle and saddle screw.

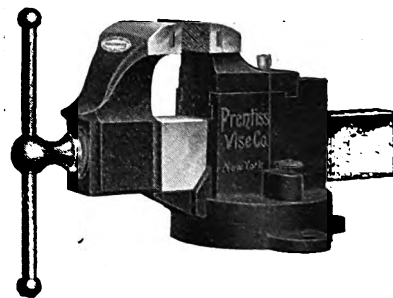
Number.....	87	88	288½	289½
Width of jaws, in.....	3½	4½	5	6
Jaws open, in.....	3	5	6	9½
Holds pipe, in.....	2	3	4	6
Weight, lbs.....	47	71	118	185
Price, each.....	\$16.00	22.00	32.00	45.00



STATIONARY BOTTOM—FIG. 710

PRENTISS VISES

Self-adjusting jaws, which conform to shape of material, and may be made stationary at will. Fine gray iron body; milled and fitted slide; wrought steel screw with cut thread; jaws faced with fine steel, hardened and milled. Jaws, screw head and lever are polished.



SWIVEL BOTTOM—FIG. 711

Number.....	Stationary Bottom							Swivel Bottom						
	1	2	2½	3	4	5	6	18	19	19½	20	21	22	23
Width of Jaws .....inches	2⅝	3½	4	4½	5¼	6	7	2⅝	3½	4	4½	5¼	6	7
Jaws Open "	3½	4¾	5¼	6	8	9	11	3½	4¾	5¼	6	8	9	11
Weight .....pounds	13½	28	41	54	96	146	184	17	32	46	65	109	163	207
Price.....each	\$13.50	16.00	19.00	22.00	35.00	50.00	65.00	16.00	20.00	24.00	28.00	44.00	60.00	75.00

COLUMBIAN VISES

STEEL BAR MACHINISTS' VISE

MADE OF MALLEABLE IRON

This Vise has a base that can be used either stationary or to swivel, and is equipped with a specially hardened table to form an anvil back of the jaws. Being made of Malleable Iron, the anvil will not chip. The Sliding Bar is of Solid Wrought Steel. A very serviceable vise at a low price.

PRICE LIST

No.	Width Jaws Inches	Jaws Open Inches	Weight Pounds	List Price
143	3	3½	12	\$5.00
144	4	6	24	8.25

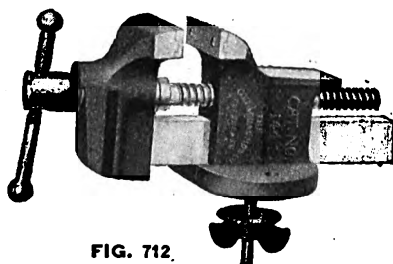


FIG. 712

COLUMBIAN VISES

ADJUSTABLE JAW STATIONARY BASE MACHINISTS'

SERIES 300

PRICE LIST

Vise No.	Width Jaw Inches	Jaws Open Inches	Weight Pounds	List Price
302	2	2½	13	\$11.50
302½	2½	3	17	13.50
303	3	4	24	15.00
303½	3½	4¾	28	16.00
304	4	5¼	42	19.00
304½	4½	6	52	22.00
305	5	7½	78	28.00
305½	5½	9	97	35.00
306	6	9½	140	50.00
307	7	11	180	65.00
308	8	12	270	90.00

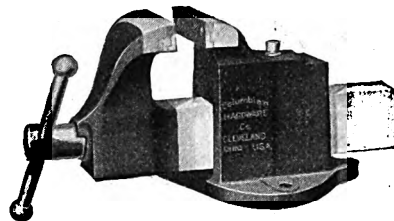


FIG. 713

The design of the adjustable-jaw vise is such that it is just as strong as the solid-jaw vise. By removing the pin from the back jaw it will swivel to any required position, gripping irregular or tapered work securely.

This vise will stand up under the roughest machine-shop usage, and is indispensable in a tool room when fine work is to be done.

ADJUSTABLE JAW SWIVEL BASE MACHINISTS'

SERIES 400

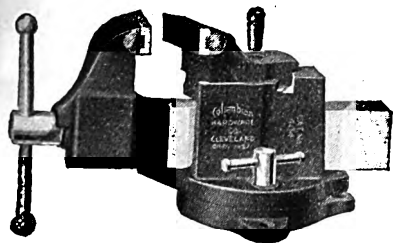


FIG. 714

The adjustable jaw plus the adjustable base make this a very practical vise. It is just as strong as the solid-jaw vise and is not liable to breakage. The jaw swivels easily to any required position as will the base. We can furnish smooth faced jaws if desired without additional cost to the purchaser. All parts of these vises are interchangeable.

PRICE LIST

Vise No.	Width Jaw Inches	Jaws Open Inches	Weight Pounds	List Price
402	2	2½	15	\$13.50
402½	2½	3	22	16.00
403	3	4	30	17.50
403½	3½	4¾	44	20.00
404	4	5¼	52	24.00
404½	4½	6	66	28.00
405	5	7½	89	35.00
405½	5½	9	115	44.00
406	6	9½	168	60.00
407	7	11	205	75.00
408	8	12	300	105.00

HEAVY-CHIPPING

SERIES 107

This vise is designed especially for extra heavy work in railroad shops and steel mills. It is practically indestructible. The screw is a solid drop-forging. The handle and balls are forged from one piece of steel.

PRICE LIST

Vise No.	Width Jaw Inches	Jaws Open Inches	Weight Pounds	List Price
107	7	11½	218	\$37.50
108½	8½	13	268	50.00

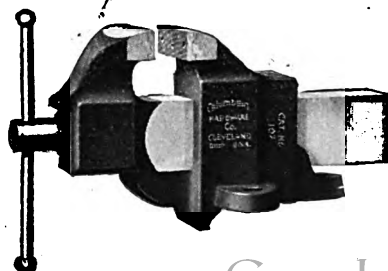


FIG. 715

COLUMBIAN VISES

SOLID JAW STATIONARY BASE MALLEABLE IRON MACHINISTS'

SERIES 500



FIG. 716

Here's a vise that will stand up under a strain. With the exception of screw and handle it is made entirely of Malleable Iron and is practically indestructible. The screw is solid forging. The handle is cold rolled steel, with ball ends forged from the solid rod—get that point. A vise with this feature eliminates the possibility of the ball ends jarring loose.

PRICE LIST

Vise No.	Width Jaw Inches	Jaws Open Inches	Depth Opening Jaws Inches	Weight Pounds	List Price
502	2	3	2	9	\$ 8.25
502½	2½	3½	2⅜	12	9.00
503	3	4½	2½	17	10.00
503½	3½	5	2¾	26	11.25
504	4	6	2⅞	33	12.75
504½	4½	7	3½	41	15.50
505	5	8	4	51	20.00
505½	5½	9	4	64	30.00
506	6	10	4¼	74	39.00
507	7	12	5¼	88	55.00
508	8	13	5½	150	75.00

SOLID JAW SWIVEL BASE MALLEABLE IRON MACHINISTS'

SERIES 600

PRICE LIST

Vise No.	Width Jaw Inches	Jaws Open Inches	Depth Opening Jaws Inches	Weight Pounds	List Price
602	2	3	2	12	\$10.50
602½	2½	3½	2⅜	15	12.00
603	3	4½	2½	22	13.00
603½	3½	5	2¾	33	15.00
604	4	6	2⅞	40	17.00
604½	4½	7	3½	49	20.00
605	5	8	4	59	30.00
605½	5½	9	4	74	38.00
606	6	10	4¼	90	52.00
607	7	12	5¼	103	70.00
608	8	13	5½	145	98.00

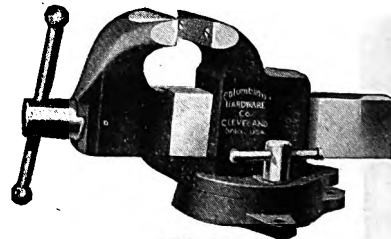


FIG. 718

This is a duplicate of the 500 series except that it offers an additional feature—the swivel base. This enables the vise to be swung around to any desired position and quickly clamped, adding greatly to its efficiency. It is also made of Malleable Iron. All vises with larger than 6-inch jaw are furnished with two swivel clamping nuts.

STATIONARY BASE COMBINATION PIPE

SERIES 100

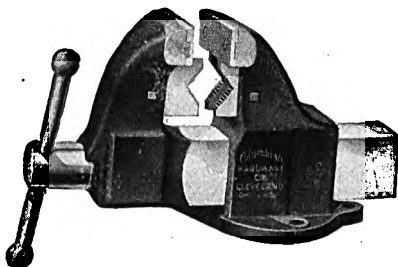


FIG. 717

Pipe jaws are made from tool steel with milled teeth, tempered to withstand the hardest usage. The screw is forged from one solid steel billet.

This equipment is a combination vise, embodying the best principles of a standard machinists' vise with the added feature—a set of jaws for holding pipe.

PRICE LIST

Vise No.	Width Jaw Inches	Holds Pipe Inches	Weight Lbs.	List Price	Jaws per Set List Price
103½	3½	⅞ to 2½	41	\$16.00	\$1.50
104½	4½	⅞ to 3½	64	22.00	1.75
105	5	⅞ to 4½	100	32.00	2.00
106	6	⅞ to 6	151	45.00	3.00

COLUMBIAN VISES

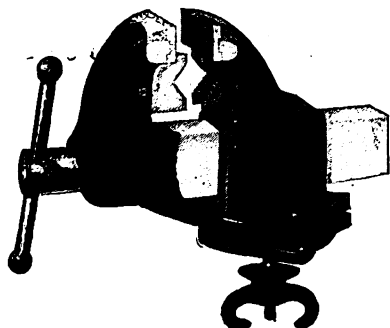
SWIVEL BASE COMBINATION PIPE
SERIES 200

FIG. 719

The front pipe jaw is reversible, so that it can be turned if desired. This means practically two sets of jaws.

PRICE LIST

Vise No.	Width Jaws Inches	Holds Pipe Inches	Jaws Open Inches	Weight Pounds	List Price	Jaws per Set List Price
203½	3½	⅛ to 2½	4	46	\$16.00	\$1.50
204½	4½	⅛ to 3½	5	70	22.00	1.75
205	5	⅛ to 4½	6¼	109	32.00	2.00
206	6	⅛ to 6	8¼	165	45.00	3.00

HINGED PIPE

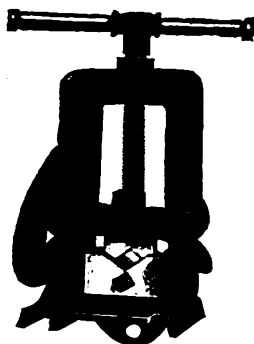


FIG. 3994

Simple in construction, best malleable iron, with steel jaws, made on the interchangeable system, so that any of the parts can be replaced if it should become necessary.

Number.....	160	161	161½	162	163
Holds pipe, in.....	⅛ to 2	⅛ to 2½	⅛ to 3½	⅛ to 4½	⅛ to 6
Price, with jaws.....	\$4.25	\$6.00	\$9.00	\$12.50	\$23.50
Extra jaws, per set.....	1.75	1.75	2.50	3.50	.6.00

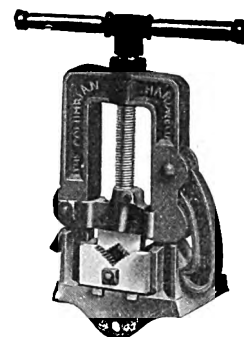


FIG. 3995

ARMSTRONG HINGED PIPE VISES

Armstrong's Hinged Vises—Simple in construction, best malleable iron, with steel jaws, made on the interchangeable system, so that any of the parts can be replaced, if it should become necessary.

Number.....	0	1	2	3
Holds Pipe, inches.....	⅛ to 2½	⅛ to 2½	⅛ to 4½	1 to 6
Price, with steel jaws,.....each	\$9.00	\$10.00	\$20.00	\$30.00
Weight, lbs.....	11	16	30	35



FIG. 722

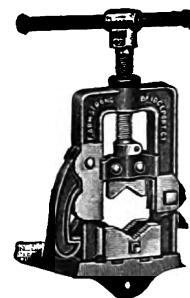


FIG. 723

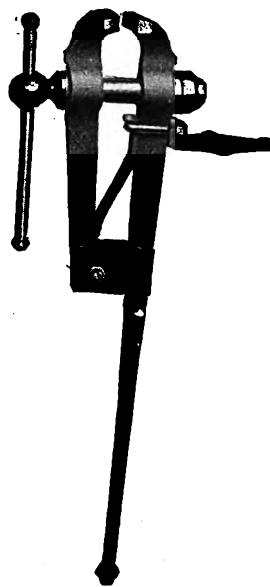


FIG. 720

COLUMBIAN BLACKSMITHS' VISE

SOLID-BOX WROUGHT-STEEL

The extraordinary depth of the throat makes this vise adaptable to a large range of work. The open end box makes the screw self cleaning and minimizes wear on the threads.

The close-coupled bench plate on this vise is the simplest, strongest, most rigid bench plate ever devised. It obviates the trouble experienced in the past of the gibs and keys becoming loose and perhaps getting lost.

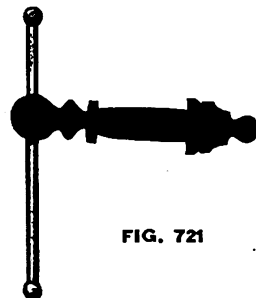


FIG. 721

PRICE LIST

Blacksmiths' Vises—Fig. 720						Boxes and Screws—Fig. 721			
No.	Weight Pounds Approx.	Length of Jaws Inches	Depth from Top of Jaw to Top of Box, Inches	Vise Opens Inches	List Each	No.	Diam. Screw Inches	Size Vise	List Each
35	35	4	3¼	3¾	\$10.00	1	1⅛	35	\$3.50
50	50	4½	4¼	4½	11.50	1	1⅛	50	3.50
70	70	5	4¾	5¼	15.00	2	1¼	70	4.00
100	100	6	5½	6	22.00	4	1½	100	6.50
125	125	6½	6	6½	27.50	4	1½	125	6.50
150	150	7	6½	7	36.00	5	1¾	150	11.00
200	200	8	7½	8	56.00	5	1¾	200	11.00

COLUMBIAN UNIVERSAL WOODWORKERS' VISES

PATTERN MAKERS'

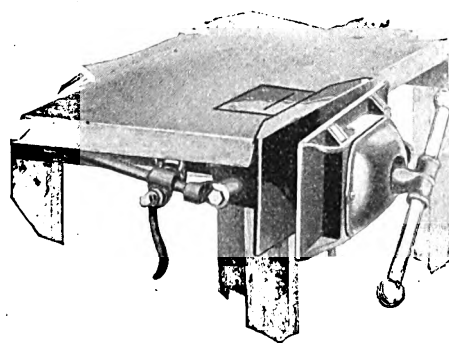


FIG. 726

The taper-jaw mechanism is the distinctive feature of the Pattern-makers' Vise.

This view shows the hinged joint behind the back-jaw; at the left the rod and clamp arrangement controlling the swing of the vise is shown.

CABINET MAKERS' AND MANUAL TRAINING

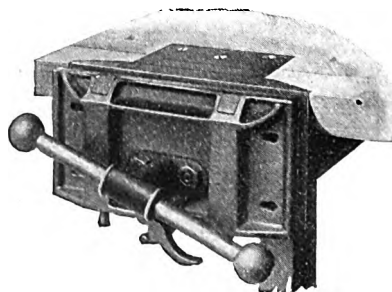


FIG. 728

The quality of materials used in the construction of this vise are genuinely Columbian. The vise adapts itself to many uses, meeting specifically the requirements of Wood Workers, Cabinet Makers, and Manual Training students.

PRICE LIST

Continuous Screw					Quick Acting				
No.	Jaw In.	Op. In.	Wt. lbs.	Price Each	No.	Jaw In.	Op. In.	Wt. lbs.	Price Each
3A	7x16	12	60	\$16.00	3B	7x16	12	65	\$17.00
4A	7x16	16	65	18.00	4B	7x16	16	70	19.50
5A	7x16	20	70	19.50	5B	7x16	20	75	20.00
6A	6x12	12	40	12.00	6B	6x12	12	42	14.00
7A	6x12	16	43	13.50	7B	6x12	16	45	16.00
8A	6x12	20	46	15.00	8B	6x12	20	49	17.00

PRICE LIST

No.	Jaw In.	Op. In.	Wt. lbs.	Price Each
1A	7x18	14	80	\$22.50
2A	7x18	18	83	26.00

COLUMBIAN MANUAL TRAINING AND WOODWORKERS VISES

SERIES 13-A AND 9-B

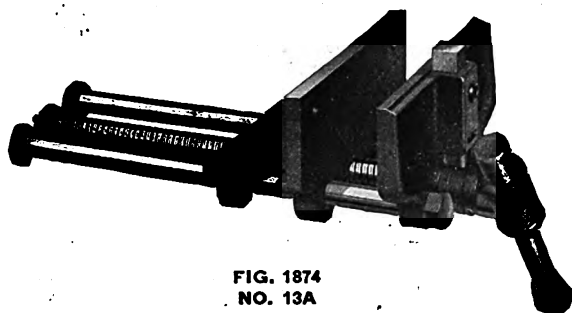


FIG. 1874
NO. 13A

This is a well constructed, heavy duty, general utility Vise. The guides are round steel rods, carefully machined. The thread is carefully proportioned and accurately cut. The quick-acting mechanism in this vise follows the standard principle of the intercepted thread, so widely developed in breach-blocks of modern ordnance. With the handle at a certain angle, the jaw can be moved freely. A slight turn and the threads are locked, to tighten at will.

PRICE LIST

CONTINUOUS SCREW, SERIES 13-A

No.	Jaw Inches	Opens Inches	Weight Pounds	Price Each
13A	4x10	12	36	\$5.50
14A	4x10	16	38	6.50
15A	4x10	20	40	7.50
16A	4x10	24	42	8.50

QUICK-ACTING, SERIES 9-B

No.	Jaw Inches	Opens Inches	Weight Pounds	Price Each
9B	4x10	12	36	\$7.00
10B	4x10	16	38	8.00
11B	4x10	20	40	9.00
12B	4x10	24	42	10.00

SERIES 13-B AND 13-BB

This is a simple "Quarter-Turn" Quick-Acting General Utility Vise for manual training work, carpenter shops, general home use and as auxiliary equipment in woodworking establishments of all kinds.

It is simply and sturdily built. The quick-acting mechanism, locking on a rack on an incline block, and tightening by a cam arrangement on the hub of the handle, is simple and direct.

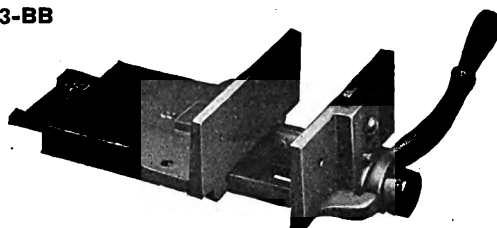


FIG. 1875
NO. 13BB

QUICK-ACTING LEVER VISE WITH DOG

QUICK-ACTING LEVER, SERIES 13-B

No.	Jaw Inches	Opens Inches	Weight Pounds	Price Each
13B	3x7	9	25	\$6.00
14B	3x7	12	27	6.50
15B	4x10	9	30	7.00
16B	4x10	12	33	8.00

QUICK-ACTING LEVER WITH DOG, SERIES 13BB

No.	Jaw Inches	Opens Inches	Weight Pounds	Price Each
13BB	3x7	9	26	\$6.50
14BB	3x7	12	28	7.00
15BB	4x10	9	31	7.50
16BB	4x10	12	34	8.50

HARGRAVE SPECIAL NEW ADJUSTABLE CLAMP

STEEL BAR—NOTCHES BELOW

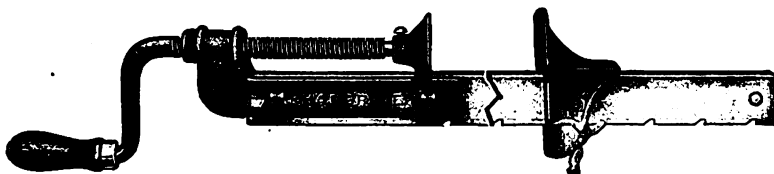


FIG. 740

This is a strong, durable, convenient, general purpose clamp. It is especially useful in all wide clamping, such as sash, doors, blinds, furniture, etc. It is made in two patterns—the light and heavy.

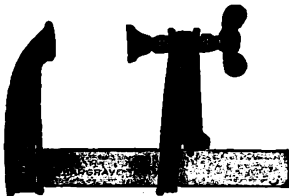
The bar is high carbon manganese steel, extra heavy, giving great strength. Frame, tip and slide are of the best grade of malleable iron. Dog for slide is tempered steel.

Crank and screw are made of steel, in one piece.

Screw for light clamp is $\frac{5}{8}$ inch in diameter, and for heavy clamp, $\frac{3}{4}$ inch in diameter. It has deep cut Acme thread, with extra long bearing, insuring long life to the clamp.

With $1\frac{1}{2}$ x $\frac{1}{4}$ -Inch Bar									With $1\frac{3}{4}$ x $\frac{3}{8}$ -Inch Bar								
Stock Number.....	412	413	414	415	416	417	418	419	420	421	422	423	424	425	426	427	
Opens, feet.....	2	2 $\frac{1}{2}$	3	3 $\frac{1}{2}$	4	4 $\frac{1}{2}$	5	6	3	4	5	6	7	8	9	10	
Weight per pair, lbs.	14	15 $\frac{1}{2}$	17	18 $\frac{1}{2}$	20	21 $\frac{1}{2}$	22 $\frac{1}{2}$	25	30 $\frac{1}{2}$	35	39 $\frac{1}{2}$	44	49	52 $\frac{1}{2}$	57 $\frac{1}{2}$	62 $\frac{1}{2}$	
Price, each.....	\$7.60	7.80	8.00	8.50	9.00	9.50	10.00	11.00	16.50	17.00	18.00	19.00	20.50	22.00	25.00	28.00	

HARGRAVE QUICK CLAMPS



NOS. 500 AND 502—FIG. 736

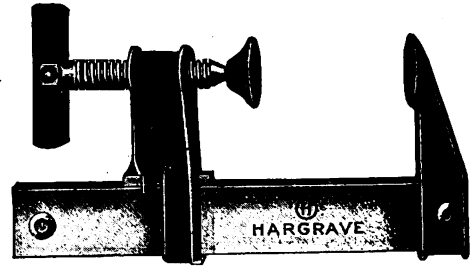
Instantaneous in action. It can be adjusted and applied to the work just as quickly as the user can pick up the clamp. Most of the time needed to put the old "C" clamp on work is taken in running down the screw to give the proper opening. This new Quick Clamp saves that time. It is stronger and takes much less room. No springs or small parts to break, wear out quickly or get lost.

Will not slip and the screw will stay where put. It will not fly off the work as an eccentric clamp will when hit by a hammer or jarred. You can get any pressure desired with one adjustment for the screw travels $1\frac{1}{2}$ inches. When through using the clamp it may be readily detached. Nothing to bind or stick. No notches in the bar. A tool steel plug, hardened and drawn in oil, takes all the wear.

The clamp is rigid at any opening.

Made in two weights and in any length. The light clamp is $2\frac{1}{2}$ inches deep from center of screw to bar. The bar is $1\frac{1}{2} \times \frac{1}{4}$ inches. The heavy clamp is $4\frac{1}{2}$ inches deep from center of screw to bar. The bar is $1\frac{1}{4} \times \frac{3}{8}$ inches.

Both the light and heavy clamps are made in two patterns—one as per Fig. 736, and the other the reverse as per Fig. 3996, having the screw on the stationary frame and the foot of the clamp on the slide. In ordering please give stock number and the size of opening desired. (Unless otherwise specified, Stock No. 500 will be sent.)



NOS. 501 AND 503—FIG. 3996

No. 500 Light bar, $1\frac{1}{2} \times \frac{1}{4}$ in., same as Fig. 736.

No. 501 Light bar, $1\frac{1}{2} \times \frac{1}{4}$ in., same as Fig. 3996.

No. 502 Heavy bar, $1\frac{3}{4} \times \frac{3}{8}$ in., same as Fig. 736.

No. 503 Heavy bar, $1\frac{3}{4} \times \frac{3}{8}$ in., same as Fig. 3996.

PRICES AND WEIGHTS FOR BOTH PATTERNS

Size of Opening, inches.....	4	6	8	10	12	18	24	30	36	48
Nos. 500-501 Light Bar, weight doz. lbs.....	40	43	46	48	51	59	67	75	83	99
Price, each.....	\$1.50	1.59	1.67	1.75	1.92	2.09	2.25	2.50	2.59	3.25
Nos. 502-503 Heavy Bar, weight doz. lbs.....	58	63	67	72	76	90	104	118	131	157
Price, each.....	\$2.17	2.34	2.50	2.67	2.84	3.34	3.84	4.34	4.84	5.84

STARRETT DRILL BLOCKS AND CLAMP

NO. 268

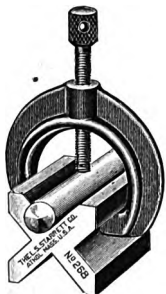


FIG. 730



FIG. 731

The drill blocks are furnished in pairs. The size of each is 2 inches x $1\frac{1}{2}$ inch.

The Clamp will hold a round piece up to $1\frac{1}{2}$ inch diameter firmly in the groove of the Blocks, for prick punching, drilling or laying out a series of holes before and while being drilled.

No. 268 C. one Clamp and two Drill Blocks, sent unless otherwise ordered.

No. 268 A Two Drill Blocks.....\$1.00

No. 268 B. Clamp......50

No. 268 C Set, complete..... 1.50

NO. 271—STEEL CASE HARDENED

These blocks are designed to be used singly or in pairs in connection with drill presses and for laying out work, prick punching, etc. The blocks may be used close together or separated and are kept in line by a spindle passing through friction bushings. They will be found convenient when holding pieces with shoulders, which may rest between the blocks. The blocks are $1\frac{1}{4}$ inch square and will hold round pieces to $1\frac{1}{4}$ inch diameter. The two grooves in each side take up the length and hold the clamp for small or large work.

PRICES

No. 271 A Two Drill Blocks	\$2.00
No. 271 B Clamp.....	.75
No. 271 C Set, complete.....	2.75

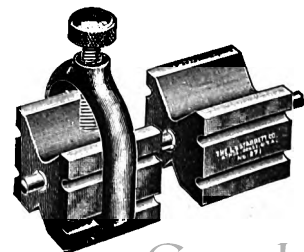


FIG. 732

STEEL DROP-FORGED "C" CLAMPS

WILLIAMS LIGHT SERVICE

Drop-forged from specially selected steel, submitted to a refining process or "heat-treatment" which increases their stiffness and strength and reduces the liability of springing. Their design is best adapted for use in the various wood and metal, etc., manufacturing fields which do not demand the extremes of strength and service for which the heavier Clamps provide—they are substitutes for tools less dependable, yet frequently more costly.

The Screws are made from tough, wrought steel and threaded specially for strength and rapid adjustment. In respective order, as per table, the minimum capacities of Clamps are as follows: 0, 0, 0, $\frac{5}{8}$, 1, 2, 3 and 4 inches.

Number.....	402	403	404	*444	406	408	410	412
Capacity, inches.....	2	3	4	4	6	8	10	12
Depth throat from center of screw, in. .	$1\frac{3}{4}$	2	$2\frac{3}{8}$	$1\frac{1}{2}$	3	$3\frac{3}{8}$	$3\frac{3}{4}$	4
Extreme length, in.	$4\frac{3}{8}$	$5\frac{5}{8}$	7	$6\frac{3}{4}$	$9\frac{1}{2}$	12	$14\frac{1}{4}$	$16\frac{1}{2}$
Extreme width, in.	$3\frac{3}{8}$	$3\frac{3}{4}$	$4\frac{3}{8}$	$3\frac{3}{8}$	$5\frac{1}{4}$	$5\frac{7}{8}$	$6\frac{1}{2}$	$6\frac{7}{8}$
Diameter of screw, in.	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{5}{8}$	$\frac{5}{8}$	$\frac{5}{8}$	$\frac{3}{4}$	$\frac{3}{4}$	$\frac{1}{2}$
Length screw over all, in.	$4\frac{3}{8}$	$5\frac{1}{8}$	$7\frac{1}{8}$	$6\frac{3}{8}$	$8\frac{1}{8}$	10	$11\frac{1}{8}$	$12\frac{1}{2}$
Approximate weight, each, lbs.	$\frac{3}{4}$	$1\frac{1}{4}$	2	$1\frac{3}{4}$	3	$4\frac{1}{2}$	6	$7\frac{1}{2}$
Price, screw, handle and swivel.	\$.30	.35	.40	.40	.50	.60	.75	1.00
Price, clamps, complete.....	\$.75	.90	1.10	1.10	1.50	2.00	2.50	3.25

FIG. 741

*Special clamp, differing only in depth of throat dimension, sectional form and style of screw.

ARMSTRONG MEDIUM SERVICE

Well adapted to that wide field of work which does not require the extra weight and extreme stiffness which make the heavy clamp unequalled for the very hardest service. The design and careful selection of material used combine in this clamp the maximum of strength and stiffness consistent with convenient weight.

Number.....	0	1	2	3	4	5	6	7	8
Capacity, inches.....	2	3	4	6	8	10	12	15	18
Depth of throat from center of screw, inches.....	$1\frac{1}{2}$	2	$2\frac{3}{8}$	$2\frac{1}{2}$	$2\frac{5}{8}$	$2\frac{3}{4}$	$2\frac{7}{8}$	$3\frac{1}{8}$	$3\frac{1}{4}$
Diameter of screw.....	$\frac{1}{2}$	$\frac{5}{8}$	$\frac{3}{4}$	$\frac{3}{4}$	$\frac{3}{4}$	$\frac{3}{4}$	$\frac{7}{8}$	$\frac{7}{8}$	$\frac{1}{2}$
Approximate weight each, lbs.	$1\frac{1}{4}$	$2\frac{1}{2}$	4	6	$7\frac{1}{4}$	$8\frac{1}{2}$	$11\frac{1}{2}$	14	18
Price, extra screw, handle and swivel. .	\$0.50	.60	.70	.70	.70	.70	.90	.90	.90
Price, clamp complete.....	\$1.75	2.00	2.25	2.75	3.25	3.75	4.25	5.50	7.00

FIG. 743

ARMSTRONG HEAVY SERVICE

WITH LONG HUB AND EXTRA LARGE ALLOY STEEL SCREW

In design, quality of material and accuracy of machining these clamps in every respect meet the demand for a strong, strictly high-grade, reliable clamp. Each clamp is boxed separately.

Number.....	9	10	11	12	13	14	15	16	18	20	22
Capacity, inches.....	$\frac{3}{4}$	$1\frac{1}{4}$	$1\frac{3}{4}$	$2\frac{1}{4}$	$3\frac{1}{4}$	$4\frac{1}{2}$	$5\frac{1}{2}$	$6\frac{1}{2}$	$8\frac{1}{2}$	$10\frac{1}{2}$	$12\frac{1}{2}$
Depth of throat from center of screw, in.	$\frac{3}{4}$	$1\frac{1}{8}$	$1\frac{1}{2}$	$1\frac{7}{8}$	$2\frac{1}{4}$	$2\frac{3}{4}$	$3\frac{1}{4}$	$3\frac{1}{2}$	$3\frac{3}{4}$	$3\frac{7}{8}$	4
Dia. screw, inches.....	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{5}{8}$	$\frac{3}{4}$	$\frac{1}{2}$	$\frac{1}{2}$	1	$1\frac{1}{8}$	$1\frac{1}{4}$	$1\frac{1}{4}$	$1\frac{1}{4}$
Approx. wt. each, lbs.	$\frac{1}{2}$	$\frac{3}{4}$	$1\frac{1}{4}$	$3\frac{1}{2}$	6	10	$13\frac{1}{2}$	$18\frac{1}{2}$	25	30	32
Price, extra screws, ea.	\$.10	.12	.16	.24	.40	.60	.75	1.00	1.50	1.75	2.00
Price, clamps complete..	\$.50	.75	1.25	1.75	2.50	3.25	4.00	5.00	7.00	9.50	12.50

FIG. 742

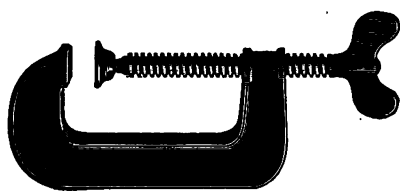


FIG. 744

CARRIAGE MAKERS' CLAMP

Heavy malleable iron frame and screw. Natural finish. Swivel head on screw.

Number.....	12	13	14	15	16	17	18	20	22
Opens, inch.....	2½	3	4	5	6	7	8	10	12
Weight, doz. lbs.....	10	12	18	27	32	36	45	63	73
Price, each.....	\$.55	.60	.80	.95	1.15	1.40	1.85	2.65	2.95

WOOD HAND SCREWS

Seasoned maple jaws. Selected hickory screw. Oil finish.

Nos.....	802	805	807	809	811
Dia. screw, in.....	1¼	1½	1	¾	¾
Length of screw, in.....	24	20	18	16	14
Length of jaws, in.....	20	18	16	14	12
Size of jaws, in.....	2½x2½	2¾x2¾	2¼x2¼	2x2	1¾x1¾
Jaws open, in.....	13¾	10½	9¾	8¼	7¼
Weight per doz., lbs.....	96	92	55	38	35
Price, dozen.....	\$32.00	27.00	23.00	20.00	15.00
Price, each.....	\$2.65	2.25	1.90	1.65	1.25

Nos.....	812	813	814	815	816
Dia. screw, in.....	¾	5/8	5/8	½	¾
Length of screw, in.....	12	10	8	6	6
Length of jaws, in.....	10	8	7	5	4
Size of jaws, in.....	1½x1½	1¾x1¾	1½x1½	1x1	7/8x7/8
Jaws open, in.....	5½	4½	3	2	1½
Weight per doz., lbs.....	20	10	8	7	4
Price, dozen.....	\$14.00	12.00	9.00	7.50	7.50
Price, each.....	\$1.15	1.00	.75	.65	.65

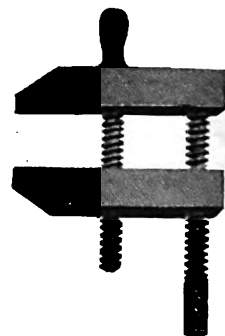


FIG. 734

PEERLESS JORGENSEN ADJUSTABLE

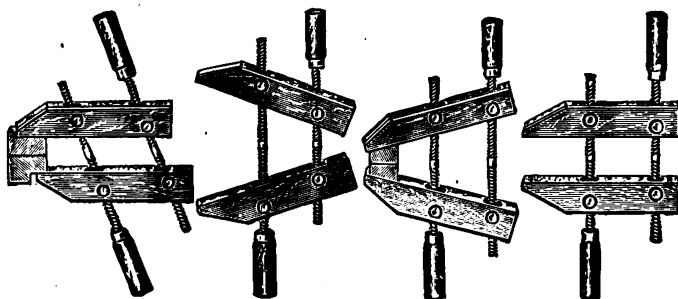


FIG. 735

A single clamp will adjust to any of these positions, or any modification of them.

Selected straight grain hard maple jaws. Cold drawn steel spindles. Cold drawn steel nuts. Accurately cut threads of special quick-acting type. Jaws can be adjusted to any angle, thus doing away with the necessity of squaring up irregular surfaces. One jaw can be made to overlap the other, forming a position very often desirable. It has a tighter grip and obtained with less power. Glue will not adhere to the spindles, causing the thread to strip. Its parts are not liable to become separated.

Nos.....	000	00	0	1	2	3	4	5
Length of jaws, inches.....	6	7	8	10	12	14	16	18
Jaws open, inches.....	3	3½	4½	6	8½	10	12	14
Weight per doz., lbs.....	11	12	25	32	50	63	85	95
Price, dozen.....	\$14.40	16.00	17.50	21.50	25.00	28.00	34.00	39.00
Price, each.....	1.20	1.35	1.45	1.80	2.10	2.35	2.85	3.25

NOXALL COLUMN CLAMPS

For clamping all kinds of staved columns, tanks or any round or polygon forms from four inches in diameter up.

It is the only clamp made with a right and left screw, giving a positive and equal strain at both ends of the chain and every point of contact. It consequently will not buckle the screw nor distort and twist the staves out of shape, but leaves the column perfectly round and true.

Price, with four feet chain.....each \$4.00

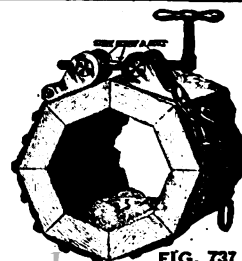


FIG. 737

METAFORMS

FOR STRAIGHT, ANGULAR, CURVED AND CIRCULAR MONOLITHIC CONCRETE WORK



FIG. 3997

The Metaform idea is so simple that it does away with the need for high priced skilled labor for erecting forms. It consists of reinforced metal sheets of various standard sizes which can be quickly locked together to form one smooth continuous mold of any size or shape. Adjustable to meet all conditions as they come and infinitely more speedy than wood form construction. Metaforms enable one man to erect more square feet of form in a given time than by any other system; when the forms are taken down there is no spoilage as when wood is used. Metaforms are practically indestructible and may be used over and over again. The best investment a contractor can make. The Metaform system of shifting molds ahead, allows continuous pouring of concrete with a surprisingly small amount of equipment. A Metaform outfit will more than save its cost in one season. The savings after that are sheer net profit for year after year. Tell us what classes of concrete work you do and we will send you complete Metaform information.

USE METAFORMS—THE MODERN SYSTEM FOR
HANDLING CONCRETE CONSTRUCTION



FIG. 3998

STERLING COLUMN CLAMP

Sterling Form Clamps can be used on any shaped column and can be adjusted to any column in $\frac{1}{2}$ to $1\frac{1}{2}$ minutes. It doesn't make any difference whether the position is within easy reach of floor or scaffold or in some inconvenient place near the top of the column, it will not take more than $1\frac{1}{2}$ minutes to adjust the Sterling Clamp and more often it will be only a $\frac{1}{2}$ minute or a minute. Just compare this remarkable time-saving rapidity with the time-losing slowness which has heretofore accompanied the clamping of forms. As contrasted to all other methods, Sterling Clamps pay their cost in less than a week's work by enabling your men to clamp up so many more forms. A sufficient number of Sterling Clamps prepares the contractor for any column work. It is not necessary to have one set of clamps for square columns, another set for round columns, nor to use two sets of square column clamps on octagonal columns. With no changes whatsoever Sterling Clamps can be used on squares, rounds, or octagonals. Sterling Clamps cost you less than one-half as much as you have had to pay for any other device for clamping concrete forms. The malleable iron lever and locking arrangement are indestructible. The band iron will last through at least two or three seasons of hard, continuous work. Replacing the band iron, when worn, makes the clamp as good as new. The band iron can be replaced at a very small cost. When the band is drawn tight, clamped and locked the clamp just has to hold tight until the form is knocked down. If the band is old and liable to break, it will break while being installed. It will never give way suddenly while on the column.



FIG. 738

WHAT THE STERLING CLAMP IS

As will be seen by the cuts, the Sterling Column Clamp consists of four principal parts.

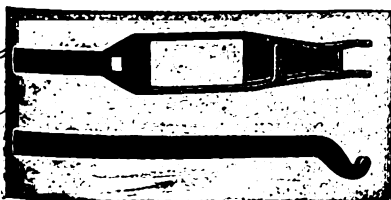


FIG. 3999
Extension Lever

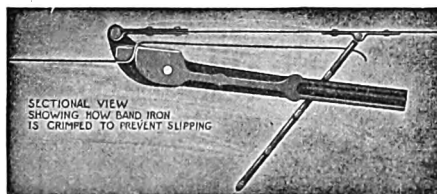


FIG. 4000
Clamping Head attached to Lever Handle

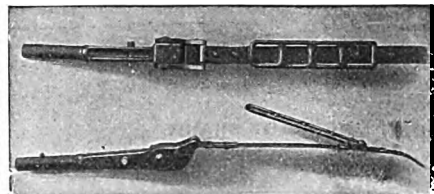


FIG. 4001
Top and Side Views of Lock Buckle

Extension lever shown (Fig. 3999) is for use where extra leverage is necessary. One extension lever is enough for at least 50 clamps, and is sold as an extra.

1. A strong malleable iron handle with heavy ribbed shoulder to give added strength where stress is greatest. (See Fig. 4001.)
2. A malleable iron ratchet clamping head which is riveted to, and pivots upon the hand lever. (See Fig. 4001.)
3. A 14 foot length of 16 gauge band steel $1\frac{1}{2}$ inches wide firmly hinge-riveted to a steel locking lever. (See Fig. 4000.)
4. A locking device with four openings attached to the steel band about 11 inches from the clamping head. (See Fig. 4001.)

Sterling Column Clamp, price each.....
Column Clamp Extension Handle, price each.....

SADDLERS' PUNCHES

NO. 20 OVAL



FIG. 771

NO. 10 ROUND



FIG. 770

Made from tool steel—hardened and tempered
Keen Edges, Carbon Finish, Polished Ends

The dimension of hole shown for oval No. 20 applies to the length of the oval.

Number.....	0	1	2	3	4	5	6	7
Size, in. Round.....	$\frac{3}{8}$	$\frac{7}{8}$	$\frac{1}{8}$	$\frac{2}{8}$	$\frac{5}{32}$	$\frac{11}{64}$	$\frac{1}{8}$	$\frac{11}{16}$
Size, in. Oval.....	$\frac{1}{8}$	$\frac{3}{8}$	$\frac{1}{4}$	$\frac{1}{8}$	$\frac{3}{16}$	$\frac{7}{32}$	$\frac{1}{8}$	$\frac{1}{4}$
Price, each.....	\$.35	\$.35	\$.35	\$.35	\$.35	\$.35	\$.35	\$.45

Number.....	8	9	10	11	12	13	14	15	16
Size in., Round	$\frac{1}{2}$	$\frac{11}{16}$	$\frac{1}{4}$	$\frac{11}{16}$	$\frac{3}{8}$	$\frac{11}{16}$	$\frac{11}{16}$	$\frac{5}{8}$	$\frac{11}{16}$
Size in., Oval..	$\frac{3}{4}$	$\frac{3}{8}$	$\frac{1}{8}$	$\frac{11}{16}$	$\frac{3}{8}$	$\frac{11}{16}$	$\frac{11}{16}$	$\frac{11}{16}$	$\frac{1}{2}$
Price, each....	\$.45	\$.45	\$.55	\$.55	\$.55	\$.65	\$.85	\$.85	\$.85

SOLID STEEL ARCH PUNCHES

EASY CUTTING

For use on paper, cloth, leather, etc. Not to be used on metal. Sizes 3 inches and under are forged from the solid bar and are not hardened.

Diameter, inches...	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{5}{8}$	$\frac{11}{16}$	$\frac{3}{4}$	$\frac{11}{16}$
Price, each.....	\$.95	\$.95	\$ 1.00	\$ 1.05	\$ 1.10	\$ 1.15	\$ 1.20	\$ 1.25

Diameter, inches.....	$\frac{7}{8}$	$\frac{11}{16}$	1	$1\frac{1}{16}$	$1\frac{1}{8}$	$1\frac{3}{8}$	$1\frac{1}{4}$
Price, each.....	\$ 1.30	\$ 1.35	\$ 1.40	\$ 1.60	\$ 1.80	\$ 2.00	\$ 2.20

Diameter, inches.....	$1\frac{5}{16}$	$1\frac{3}{8}$	$1\frac{1}{2}$	$1\frac{1}{2}$	$1\frac{5}{8}$	$1\frac{3}{4}$	$1\frac{7}{8}$
Price, each.....	\$ 2.40	\$ 2.60	\$ 2.90	\$ 3.20	\$ 3.50	\$ 3.80	\$ 4.20



FIG. 769

HOLLOW PUNCHES

For cutting all kinds of metal, fibre, hard rubber, etc. Sizes $1\frac{1}{2}$ inches and smaller are forged steel—larger sizes have wrought shank, polished bit, natural finish shank.



FORGED STEEL
FIG. 767



WROUGHT SHANK
FIG. 768

Dia., in.....	$\frac{1}{4}$	$\frac{1}{2}$	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{5}{8}$	$\frac{3}{4}$	$\frac{7}{8}$
Length, in.....	5	5	5	5	5	5	5	5
Price, each.....	\$.30	\$.45	\$.45	\$.60	\$.60	\$.75	\$.90	\$ 1.05

Dia., in.....	1	$1\frac{1}{8}$	$1\frac{1}{4}$	$1\frac{3}{8}$	$1\frac{1}{2}$	$1\frac{1}{2}$	$1\frac{5}{8}$	$1\frac{3}{4}$
Length, in.....	$5\frac{1}{2}$	$5\frac{1}{2}$	$5\frac{1}{2}$	$5\frac{1}{2}$	6	6	6	6
Price, each.....	\$ 1.20	\$ 1.35	\$ 1.50	\$ 1.65	\$ 1.75	\$ 1.80	\$ 1.95	\$ 2.10

HAND SPRING PUNCH

Eight inches long over all, Carbon Finish or Full Natural Polish. Fine Tool Steel Punches, Hardened and Tempered, Keen, Smooth Cutting Edges.

Furnished with any of the following tube diameters: $\frac{1}{8}$, $\frac{3}{16}$, $\frac{1}{4}$, $\frac{5}{16}$, $\frac{3}{8}$, $\frac{1}{2}$, $\frac{5}{8}$, $\frac{3}{4}$, and $\frac{1}{2}$ inch.

No. 1.....Price, each \$0.50

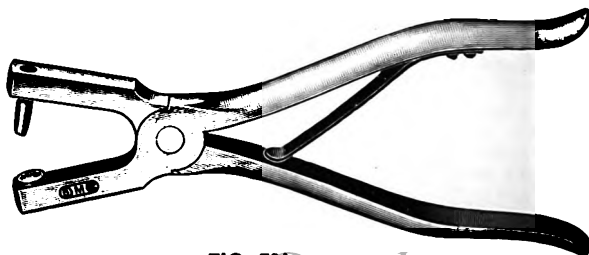


FIG. 764

REVOLVING OR SADDLER'S PUNCH

NO. 19

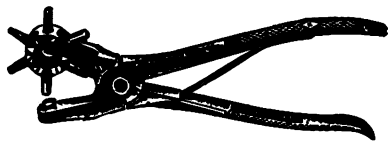


FIG. 4002

SIZES OF TUBES FOR NO. 19



FIG. 4002 1/2

Forged Steel. High grade in quality and finish. Knurled handles.

Length 8 3/4 inches, six punches. Price each..... \$1.70

REVOLVING DRIVE PUNCHES

Cast Steel Body, Black Finish, Polished Turret, with six punches, made of finest Tool Steel, Reamed Holes and Keen Edges.

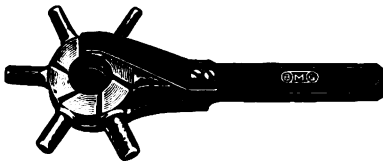


FIG. 760

No. 160, Price each \$0.60, Extra Punches, each \$0.10

No. 260, Price each \$2.00, Extra Punches, each \$0.20

No. 160, ACTUAL SIZE OF PUNCHES



FIG. 761

No. 260, ACTUAL SIZE OF PUNCHES

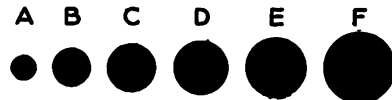


FIG. 762

AUTO PUNCHES

High Grade Octagon Crucible Tool Steel, Polished Heads and Tapers. Extra Long Taper.



NO. 106, 6 INCHES LONG—FIG. 758



NO. 108, 9 INCHES LONG—FIG. 759

Size Steel inches	Diam. Point inches	Price each	Size Steel inches	Diam. Point inches	Price each
3/8	1/8	\$0.25	1/4	1/8	\$0.30
5/8	1/4	.25	3/8	1/4	.30
3/4	3/8	.25	1/2	3/8	.34
7/8	1/2	.25	3/4	1/2	.42
1	3/4	.25	1	3/4	.46
1 1/8	7/8	.25	1 1/8	7/8	.46
1 1/4	1	.25	1 1/4	1	.55

NO. 109, 9 INCHES LONG

Size of Steel 5/8-inch; Diam. of Point 1/8-inch. Price each..... \$0.34

BUSHING PUNCH

NO. 600

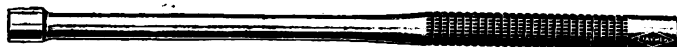


FIG. 772

Hammer forged; electrically tempered. Made of half-inch high-grade steel. Especially adapted for driving out: steering knuckle bushings, wrist pin bushings, spring hanger bushings. Will move any bushing on any car without damaging adjacent parts. Simple, strong, sure. Length over all, 9 inches.

Price, each.....\$0.75

BELL CENTERING PUNCHES

Used by machinists to mark the center of round iron in order to place it between the lathe centers correctly.

No. 1—Centers shafts up to $1\frac{3}{8}$ inch diameter. Price each.....\$0.60

No. 2—Centers shafts up to 2 inch diameter. Price each..... 1.50

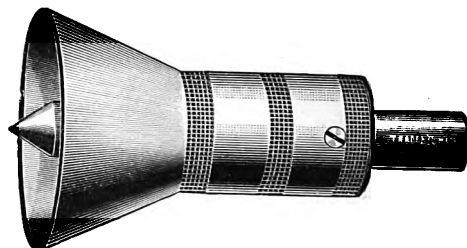


FIG. 757

AUTOMATIC CENTER PUNCH

STARRETT'S NO. 18



FIG. 756

ADJUSTABLE STROKE

For laying out fine work. No hammer needed to use it. Contains a mechanism which automatically strikes a blow of any required force when the punch is in the exact position desired by the operator.

Number	18AA	18A	18B	Extra Points, each.
Length, inches.....	$3\frac{3}{4}$	5	6	
Diameter, in.....	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{5}{8}$	
Price.....	\$1.50	\$2.00	\$2.50	\$0.15

Unless otherwise ordered, size A will be sent.

CENTER PUNCHES

MADE OF FINE TOOL STEEL—BLUED FINISH

No. 20 has Square Head. Round Knurled Body. Both ends hardened, with square armor or shield of mild, soft steel around striking end. Will not roll and will not mushroom.

Length, inches.....	$3\frac{1}{4}$	4	4	$4\frac{1}{4}$	$4\frac{1}{2}$
Diameter, inches.....	$\frac{1}{4}$	$\frac{1}{8}$	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{1}{2}$
No. 10, Price each.....	\$0.11	.15	.20	.30	.38
No. 20, Price each.....	\$0.13	.17	.23	.33	.43
No. 30, Price each.....	\$0.10	.13	.15	.18	.23

NO. 30—FIG. 754
OCTAGONNO. 10—FIG. 753
ROUND KNURLED BODY

NO. 20—FIG. 755

SET OF CENTER PUNCHES

NO. 3 C. P. O. K. BRAND

This set comprises one of each of the following sizes mounted on a card: $2\frac{1}{4}$ inch length, $\frac{1}{8}$ inch body diameter; $2\frac{3}{4}$ inch length, $\frac{1}{4}$ inch body diameter; 4 inch length, $\frac{3}{8}$ inch body diameter.

Price per set.....\$0.50

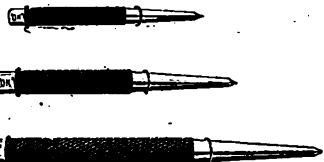


FIG. 4003

PIN PUNCHES

OCTAGON

IN SETS

No. 411 A set of four punches. Size of points, $\frac{1}{8}$, $\frac{1}{4}$, $\frac{3}{8}$ and $\frac{1}{2}$ inch. Weight per set, 1 lb.

Price per set.....\$0.50

No. 412 A set of four punches. Size of points, $\frac{3}{8}$, $\frac{1}{2}$, $\frac{3}{4}$ and 1 inch. Weight per set, 1 lb.

Price per set.....\$1.00



FIG. 750

Hand forged; electrically tempered and finely finished. A full 6 inches long, with straight point long enough to drive the most refractory pin clear without "sticking" the punch. Especially appreciated by the automobilist, garage proprietor, machinists and all mechanics. Price, each.....\$0.15



FIG. 751

NO. 120



FIG. 748

MADE OF HIGH GRADE TOOL STEEL HEAVY STOCK

No. of Punch	6	5	4	3	2	1
Size of Point	$\frac{1}{8}$	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{3}{4}$	$\frac{1}{2}$	$\frac{3}{8}$
Diameter of Steel.....	$\frac{1}{8}$	$\frac{1}{4}$	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{3}{4}$	$\frac{1}{2}$
Length, inches.....	$5\frac{1}{2}$	$5\frac{1}{2}$	6	6	$6\frac{1}{2}$	$6\frac{1}{2}$
Price each	\$0.20	.20	.20	.25	.25	.30

IN SETS

A set of one each of No. 120 (6 punches) neatly encased in a strong brown canvas pouch, makes a very useful set of tools for an auto kit.

No. 121—In Pouch
\$1.55 per set

No. 122—In Paper Box
\$1.35 per set

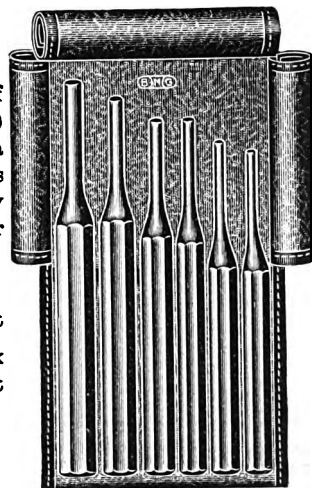


FIG. 752

EXTRA LONG EMBOSSED—NO. 593

Hand forged; electrically tempered. Made of $\frac{1}{2}$ inch Special Steel, in four sized points only, as follows:

$\frac{1}{8}$, $\frac{1}{4}$, $\frac{3}{8}$ and $\frac{1}{2}$. Weight per dozen 4 lbs. 8 ozs.

Price each.....\$0.35

SET NO. 596

A set of four No. 593 punches: $\frac{1}{8}$, $\frac{1}{4}$, $\frac{3}{8}$ and $\frac{1}{2}$ inch, in a box. Weight per set 1 lb. 6 oz.

Price per set.....\$1.40

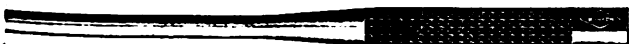


FIG. 749

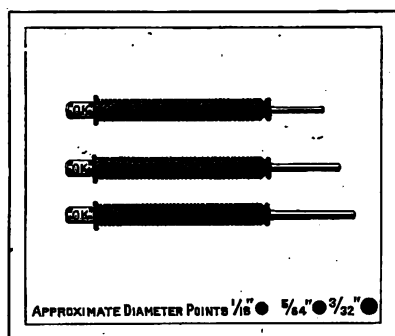


FIG. 4004

SETS OF DRIVE PIN PUNCHES

NO. 36 O. K. BRAND—LIGHT

This set comprises one each of the following sizes mounted on a card: $2\frac{1}{4}$ inch length, $\frac{3}{16}$ inch diameter body; $2\frac{3}{8}$ inch length $\frac{1}{8}$ inch diameter body; $2\frac{1}{2}$ inch length, $\frac{1}{16}$ inch diameter body.
Price per set..... \$0.50

NO. 38 O. K. BRAND

This set comprises one each of the five following sizes in box with cover; all sizes 4 inches long: $\frac{1}{16}$ inch body diameter, $\frac{1}{8}$ inch point; $\frac{1}{8}$ inch body diameter $\frac{3}{16}$ inch point; $\frac{3}{8}$ inch body diameter, $\frac{1}{8}$ inch point; $\frac{3}{16}$ inch body diameter, $\frac{3}{16}$ inch point; $\frac{3}{8}$ inch body diameter, $\frac{1}{4}$ inch point.
Price per set.....\$1.25

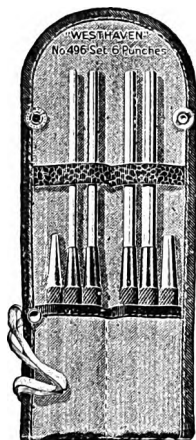


FIG. 4006

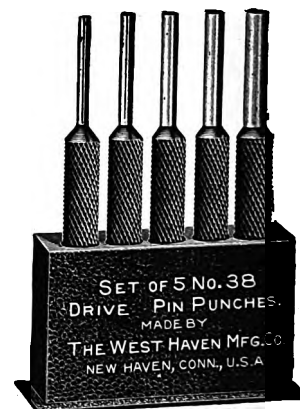


FIG. 4005

NO. 496

This set comprises one each of the four following sizes: 9 inch length, pin drive part $4\frac{1}{2}$ inches long, $\frac{1}{16}$, $\frac{1}{8}$, $\frac{1}{4}$, $\frac{3}{8}$ and $\frac{1}{2}$ inch diameters; two solid drive or pin-starting punches, points $\frac{1}{16}$ and $\frac{1}{8}$ inch diameters. All in a cloth roll or container.
Price per set..... \$3.00

PRICK PUNCHES

MADE OF FINE TOOL STEEL, BLUED FINISH.

No. 22, Square Head. Round Knurled Body. Both ends hardened with square armor or shield of mild, soft steel around striking ends. Will not roll and will not mushroom.

PRICE EACH			
Number.....	11	22	33
$\frac{1}{16}$ -inch Dia. Stock, length 4 ins.	\$0.10	\$0.15	\$0.10
$\frac{3}{8}$ -inch Dia. Stock, length 4 ins. ....	.15	.15	.15



NO. 33—FIG. 747
OCTAGON



NO. 11—FIG. 745
ROUND KNURLED BODY



NO. 22—FIG. 746

ASSEMBLING TOOL

NO. 2



FIG. 4007

Especially adapted for automobile repairing and assembling. This tool is 10 inches long, $\frac{1}{2}$ inch body diameter, $\frac{1}{8}$ inch point diameter. Made of tool steel, taper part tempered. It is a time saver in lining up holes through which pins, bolts, screws, etc., are to be placed.

Price, each.....\$0.80

NAIL SETS

KNURLED, POLISHED AND BLUED

ROUND BODY

No.	Diam., in.	Length, in.	Points cupped	Price, each
10	$\frac{1}{16}$	4	$\frac{1}{32}$ to $\frac{1}{16}$	\$0.10
15	$\frac{1}{8}$	4	$\frac{1}{32}$	.10
20	$\frac{3}{16}$	4	$\frac{1}{16}$ and $\frac{1}{4}$	.15
30	$\frac{1}{4}$	4 $\frac{1}{2}$	$\frac{1}{16}$ and $\frac{1}{4}$	.25
40	$\frac{5}{16}$	4 $\frac{1}{2}$	$\frac{3}{16}$ and $\frac{1}{4}$	.35



FIG. 765

SQUARE HEAD

Will not roll away. Is hardened on both ends, and will not curl up by hammer blows.

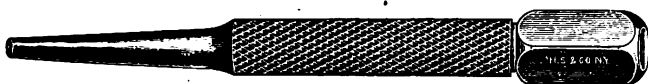


FIG. 766

No.	Diam., in.	Length, in.	Points cupped	Price, each
50	$\frac{5}{16}$	4	$\frac{1}{32}$ to $\frac{3}{16}$	\$0.15
70	$\frac{3}{8}$	4	$\frac{1}{16}$ to $\frac{1}{4}$	.20

SET OF ASSORTED PUNCHES

NO. 39 O. K. BRAND

This set comprises one each of the following punches, in box provided with cover:

One center punch, $\frac{3}{8}$ inch body, length 4 inches.

Two solid drive punches, length 4 inches, points $\frac{1}{8}$ inch- $\frac{3}{16}$ inch.

Two drive pin punches, length 4 inches, points $\frac{1}{32}$ inch- $\frac{1}{16}$ inch.

Price per set.....\$1.25



FIG. 4008

AUTOMOBILE TOOL KIT

NO. 500

This neat little case containing ten tools with patented embossed hand hold, made of the highest grade steel obtainable for the purpose, can be rolled up very compactly, thereby occupying very little space.

The tools enclosed are as follows:

One center punch, $\frac{1}{2}$ inch body, length 6 inches.

One prick punch, $\frac{1}{4}$ inch body, length 6 inches.

Two pin punches, $\frac{1}{2}$ inch body, length 6 inches, points $\frac{1}{4}$ inch- $\frac{1}{16}$ inch.

Two pin punches, $\frac{1}{4}$ inch body, length 6 inches, points $\frac{1}{16}$ inch- $\frac{3}{16}$ inch.

One scriber.

One cotter pin puller and offset screw driver.

Two cold chisels, $\frac{1}{4}$ inch- $\frac{1}{2}$ inch.

Price per set.....\$2.50

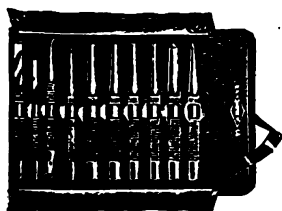


FIG. 4009

GARAGE TOOL KIT

NO. 501

A new garage and automobile tool kit designed to fill the demand for a more complete set. Contains the following finely knurled tools; in a durable brown duck roll with strong leather strap:

- One center punch, $\frac{3}{16}$ inch point, length 6 inches.
- One center punch, $\frac{10}{32}$ inch point, length 6 inches.
- One pin punch, $\frac{1}{16}$ inch point, length 6 inches.
- One solid punch, $\frac{1}{16}$ inch point, length 6 inches.
- One pin punch, $\frac{1}{16}$ inch point, length 9 inches.
- One pin punch, $\frac{1}{16}$ inch point, length 9 inches.
- One pin punch, $\frac{10}{32}$ inch point, length 9 inches.
- One pin punch, $\frac{10}{32}$ inch point, length 9 inches.
- One bushing punch, length 9 inches.
- One cold chisel, $\frac{3}{8}$ inch.
- One cape chisel, $\frac{1}{4}$ inch.
- One cotter pin puller.

Price per set..... \$3.75

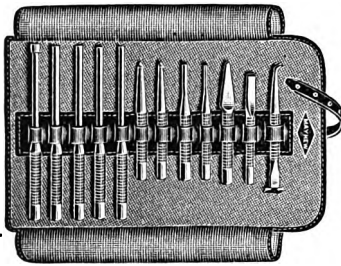


FIG. 4010

AUTO CHISEL AND PUNCH SET

NO. 7

An assortment of twelve high grade tools, made from good octagon tool steel, 5 inches long, $\frac{3}{8}$ in. diameter, put up in a strong leatherette roll. Just the thing for automobile kits.

The assortment comprises:

- 2 Cold chisels.
- 2 Cape chisels.
- 1 Half round cold chisel.
- 1 Diamond nose cold chisel.
- 1 Round nose cold chisel.
- 1 Round end solid punch.
- 1 Square end solid punch.
- 1 Center punch.
- 1 Prick punch.
- 1 Nail set.

List price..... Per set \$2.50

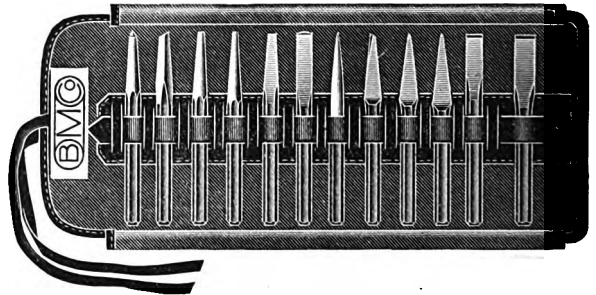


FIG. 802

AL-O-ITE COLD CHISELS

NO. 25

Made of a special high-priced steel tested to stand the constant pounding and hard usage given a cold chisel. Individually tempered and tested. Point is properly beveled. Polished blade with gun metal octagon body.

Size, Steel, inch	$\frac{1}{4}$	$\frac{1}{2}$	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{5}{8}$	$\frac{3}{4}$	$\frac{7}{8}$	1
Length, inches.....	5 $\frac{1}{4}$	5 $\frac{1}{2}$	5 $\frac{3}{4}$	6	6	6 $\frac{3}{8}$	7 $\frac{1}{2}$	8
Weight per doz. lbs....	1	1 $\frac{1}{2}$	2 $\frac{1}{4}$	3 $\frac{1}{2}$	4	7	11	20
Price each.....	\$0.26	.27	.28	.34	.35	.45	.57	.77

Order by number, size and length.

SET NO. 400

Containing one each $\frac{1}{4}$, $\frac{1}{2}$, $\frac{3}{8}$, 1; two each $\frac{3}{8}$, $\frac{1}{2}$; three each $\frac{1}{2}$, $\frac{3}{4}$; four each $\frac{5}{8}$ inch.

Price of Assortment..... \$8.50

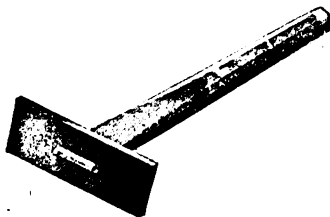


FIG. 801

CHISELS

Made from select high-grade crucible tool steel, hand forged and hand tempered, and with polished heads and blades.

COLD



FIG. 773

REGULAR LENGTHS

Size, oct.....	$\frac{1}{4}$	$\frac{1}{2}$	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{5}{8}$	$\frac{3}{4}$	$\frac{7}{8}$	1
Length, in.....	4	4 $\frac{1}{2}$	5	5 $\frac{1}{2}$	6	7	8	8
Weight per doz., lbs.	$\frac{5}{8}$	1 $\frac{1}{4}$	2 $\frac{1}{2}$	4	6	10 $\frac{1}{2}$	16	21
Price, each.....	\$0.14	.14	.16	.17	.21	.26	.35	.46
Price, doz.....	\$1.60	1.65	1.85	2.50	3.05	4.20	5.45	7.20

LONG LENGTHS

Diameter, inch.....	$\frac{1}{2}$	$\frac{3}{8}$	$\frac{3}{4}$	$\frac{7}{8}$	1
PRICE EACH					
Length 12 inches.....	\$0.24	\$0.37	\$0.50	\$0.69	\$0.88
Length 15 inches.....	.28	.44	.59	.82	1.05
Length 18 inches.....	.32	.50	.69	.95	1.20
Length 24 inches.....	.40	.65	.88	1.20	1.55

CHISELS

Made from select High Grade Crucible Tool Steel. Hand Forged and Hand Tempered and with Polished Heads and blades.

CAPE

FLAT POINT



FIG. 777

Size oct., in.....	1/4	5/16	3/8	1/2	5/8	3/4	7/8	1
Length, in.....	4	4 1/2	5	5 1/2	6	7	8	8
Wt. per doz. lbs...	5/8	1 1/4	2	3 1/2	6	10	15	19
Price, each.....	\$0.14	.17	.19	.25	.35	.44	.54	.69
Price, doz.....	\$1.60	2.00	2.30	3.00	4.10	5.20	6.50	8.20

Cutting size one-half of octagon size.

HALF ROUND POINT



FIG. 778

Size oct., in.....	1/4	5/16	3/8	1/2	5/8	3/4	7/8	1
Length, in.....	4	4 1/2	5	5 1/2	6	7	8	8
Wt. per doz. lbs...	5/8	1 1/4	2	3 1/2	6	10	15	20
Price, each.....	\$0.14	.17	.19	.25	.35	.44	.54	.69
Price, doz.....	\$1.60	2.00	2.30	3.00	4.10	5.20	6.50	8.20

ROUND AND DIAMOND NOSE

ROUND NOSE



FIG. 775

Size oct., in.....	1/4	5/16	3/8	1/2	5/8	3/4	7/8	1
Length, in.....	4	4 1/2	5	5 1/2	6	7	8	8
Wt. per doz. lbs...	5/8	1 1/4	2	3 1/2	5 1/2	10	15	20
Price, each.....	\$0.14	.17	.19	.25	.35	.44	.54	.69
Price, doz.....	\$1.60	2.00	2.30	3.00	4.10	5.20	6.50	8.20

Cutting size one-half of octagon size.

DIAMOND NOSE



FIG. 776

Size oct., in.....	1/4	5/16	3/8	1/2	5/8	3/4	7/8	1
Length, in.....	4	4 1/2	5	5 1/2	6	7	8	8
Wt. per doz. lbs...	5/8	1 1/4	2	3 1/2	5 1/2	9	15	20
Price, each.....	\$0.14	.17	.19	.25	.35	.44	.54	.69
Price, doz.....	\$1.60	2.00	2.30	3.00	4.10	5.20	6.50	8.20

OIL GROOVE AND PLUGGING

OIL GROOVE



FIG. 779

FOR CUTTING GROOVES IN BEARINGS, ETC.

Size oct., in.....	3/8	1/2	5/8	3/4
Length, in.....	5 1/2	6	6 1/2	7
Weight per doz. lbs...	2	4	6	10
Price, each.....	\$0.34	.40	.50	.70
Price, per doz.....	\$4.00	4.80	6.00	8.40

Cutting size one-half of octagon size.

PLUGGING



FIG. 800

Size oct., in.....	1/2	5/8
Length, in.....	9	10
Weight per doz. lbs...	5	9
Price, each.....	\$0.38	.40
Price, doz.....	\$4.40	4.80

STONE CUTTERS' CHISELS

MADE OF BLACK DIAMOND AND PEERLESS EXTRA STEEL

PLAIN CHISELS



FIG. 2508

SPLIT CHISELS



FIG. 2509

After Octagon Steel.
ways state size of shank desired.

	Per Lb. B. D.	Per Lb. P. Ex.
1/2-inch	\$0.17	\$0.20
5/8-inch	.14 1/2	.17
3/4-inch	.12 1/2	.15
7/8-inch	.12	.14 1/2

In ordering, in addition to size of steel and size of shank, state width of blade wanted.

	Each B. D.	Each P. Ex.
Steel		
1/2-inch	\$0.22	\$0.25
5/8-inch	.25	.28
3/4-inch	.30	.35

STONE CUTTERS' CHISELS

MADE OF BLACK DIAMOND AND PEERLESS EXTRA STEEL

BUSH CHISELS



FIG. 2510

Order by number and state size of shank and number of blades.

No.	Jaws Open Inches	Price each	Price Extra Blades
0	$\frac{3}{4}$, any number of blades	\$2.75	\$0.85
1	$\frac{5}{8}$ " " " "	2.50	.75
2	$\frac{1}{2}$ " " " "	2.25	.65
3	$\frac{3}{8}$ " " " "	2.00	.50
4	$\frac{1}{4}$ " " " "	1.75	.45
5	$\frac{1}{8}$ " " " "	1.75	.40

MARBLE TOOTH CHISELS



FIG. 2511

Made from Quarter or Full Octagon Steel.

Blade In.	$\frac{1}{2}$ -inch STEEL Each B. D.	Each P. Ex.
$\frac{3}{8}$	\$0.18	\$0.21
$\frac{1}{2}$	.18	.21
$\frac{5}{8}$	.19	.22
$\frac{3}{4}$	.20	.23
$\frac{7}{8}$	.21	.24
1	.22	.25
$1\frac{1}{8}$	.23	.26
$1\frac{1}{4}$	.24	.27
$1\frac{1}{2}$	.25	.28
2	$\frac{5}{8}$ -inch STEEL	.35
$2\frac{1}{2}$	.32	.40
3	$\frac{3}{4}$ -inch STEEL	.45
	.40	

CHISEL BLANKS



FIG. 2512

Quarter Octagon Steel.

Steel inches	Per lb. B. D.	Each P. Ex.
$\frac{3}{8}$	\$0.15	\$0.18
$\frac{1}{2}$	.12 $\frac{1}{2}$	.15
$\frac{5}{8}$	.10 $\frac{1}{2}$	.13
$\frac{3}{4}$	.10	.12 $\frac{1}{2}$

CARVERS DRILLS



FIG. 2513

$\frac{1}{2}$ -inch steel, each B.D.	\$0.12	P. Ex. \$0.14
$\frac{5}{8}$ -inch steel, each B.D.	.15	P. Ex. .17

PEEN CHISELS OR "BUMPERS"

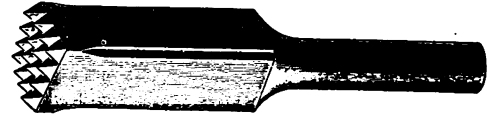


FIG. 2514

Size of shank as ordered. Steel inches	Number of teeth	Each B. D.	Each P. Ex.
$\frac{5}{8}$	4	\$0.22	\$0.25
$\frac{3}{4}$	6 & 9	.25	.28
$\frac{1}{2}$	4	.25	.28
$\frac{3}{4}$	6 & 9	.27	.30
$\frac{1}{2}$	16	.35	.40
1	4	.35	.40
1	6 & 9	.40	.45
1	16	.50	.55
$1\frac{1}{4}$	25	.85	.95
$1\frac{1}{2}$	36	1.25	1.55

MARBLE CLEANING UP CHISELS



FIG. 2515

Quarter Octagon Steel.

Blade In.	$\frac{1}{2}$ -inch STEEL Each B. D.	Each P. Ex.
$\frac{3}{8}$	\$0.12	\$0.14
$\frac{1}{2}$	.12	.14
$\frac{5}{8}$	.13	.15
$\frac{3}{4}$	.14	.16
$\frac{7}{8}$	.15	.17
1	.16	.18
$1\frac{1}{8}$	.18	.20
$1\frac{1}{4}$	.20	.22
$1\frac{1}{2}$	$\frac{5}{8}$ -inch STEEL	.25
2	.25	.30
$2\frac{1}{2}$	.30	.35
3	$\frac{3}{4}$ -inch STEEL	.40
	.35	

SPLITTERS



FIG. 2516

$\frac{1}{2}$ -inch each	.....	\$0.18
$\frac{3}{8}$ -inch each	.....	.....

RIPPERS



FIG. 2517

$\frac{1}{2}$ -inch steel, each	.....	\$0.14
$\frac{5}{8}$ -inch steel, each	.....	.17

PACKING TOOLS

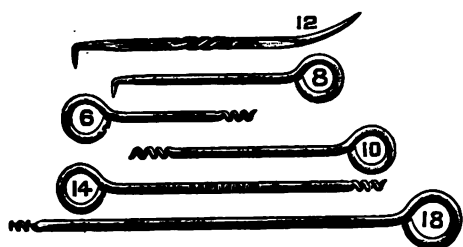


FIG. 808

Will go into any Valve Rod Pump or Engine Stuffing Box.

Made from a special tool steel, are warranted not to break in removing packing from stuffing boxes of engines, pumps, etc., and need only to be seen to be appreciated. Can be bent to meet any requirement. Handsomely nickel-plated. The small styles are made from $\frac{1}{8}$ -inch, the medium from $\frac{1}{4}$ inch and the large from $\frac{3}{8}$ -inch steel.

No. 1—Set of 4 Packing Tools, Nos. 6, 10, 12 and 14.....\$1.90

No. 6—Set of 6 Packing Tools, Nos. 6, 8, 10, 12, 14 and 18.. 2.80

SPECIAL LARGE PACKING TOOLS

Made of $\frac{3}{8}$ -inch steel, heavy screw point.

20 inches long, Nickel-Plated.....\$1.20

25 inches long, Nickel-Plated..... 1.45

CARBON SCRAPER SETS

No. 1770—Consists of one Out Turn Scraper, One In Turn Scraper and One Curved End Scraper. Entire length 16 inches with Hardwood Mahogany Finish Wood Handles, and Polished Finish Scraper. Used to Scrape Carbon from Engine Cylinders; for Automobiles or any Gas or Gasoline Engine; Weight per set 1 Pound. List Price.....Set \$2.00

No. 1771—Has Hardwood Natural Polished Finish Wood Handles and Oil Finish Scraper, otherwise same as above. List Price.....Set \$1.50

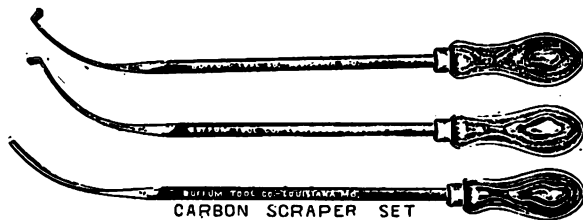


FIG. 803

BEARING SCRAPERS

THREE SQUARE BLADE—GROUND CONCAVE

UNHANDLED



FIG. 807

Length, inches.....	6	8	10
No. 40, Price each.....	\$0.60	\$0.75	\$0.85

HANDLED



FIG. 806

Blades, inches.....	6	8	9
Cutting edge, inches.....	2 $\frac{3}{4}$	3 $\frac{1}{4}$	3 $\frac{3}{4}$
No. 70—Price each.....	\$0.50	\$0.63	\$0.71
No. 73 Set:—One each, 6, 8 and 9 inches, in a neat paper box.....	\$1.80 per set		

FOUR EDGE BLADE

HAND FORGED, POLISHED



FIG. 805

Non-Chattering Rubberoid Handle, with leather pocket on blade.

No. 552 Polished Blade, Ebony Shank, each.....\$0.80

BEARING SCRAPERS

GOODELL-PRATT



FIG. 4011

Forged from highest grade tool steel and very carefully hardened and tempered. Polished hardwood handles, and polished round shanks make them very attractive tools. The shape of the cutting edges gives them a very smooth, easy cut.

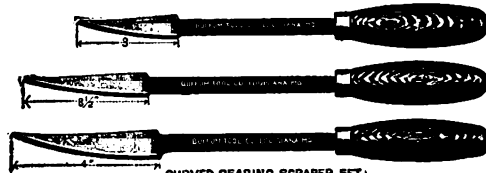
- No. 381—Length of cutting edge $2\frac{1}{2}$ inches.
Length over all, 10 inches. Price, each\$1.25
- No. 382—Length of cutting edge $3\frac{1}{2}$ inches.
Length over all, 11 inches. Price, each\$1.35
- No. 383—Length of cutting edge $4\frac{1}{2}$ inches.
Length over all, 12 inches. Price, each\$1.75
- No. 471—Set of one each No. 381, No. 382 and No. 383.
Price, per set.....\$3.75
- One packed in a cardboard carton. Weight $1\frac{1}{4}$ lbs.

BUFFUM CURVED

Made of a high grade steel, hollow ground. Brass nickel plated ferrules. Scraper ends are polished. Hardwood handles, mahogany finish. In sets of three, one each, 13, $13\frac{1}{2}$ and 14 inches in length.

No. 1765—Price, per set.....\$1.50

One set in a cardboard box.



CURVED BEARING SCRAPER SET
FIG. 4012

PLOMB

These bearing scrapers are all hand made from extra high-grade tool steel, and each one is individually tempered, hard enough to scrape the hardest bronze bearing. They have concave bottoms so that they are easily kept sharp.

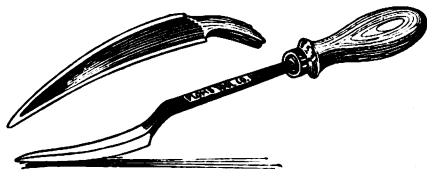


FIG. 4013

- No. 1 Size of cutter $\frac{3}{8} \times 2\frac{1}{2}$ inches, length over all, price, each.....\$1.45
- No. 2 Size of cutter $\frac{1}{2} \times 3$ inches, length over all, price, each.....1.65
- No. 3 Size of cutter $\frac{5}{8} \times 3\frac{1}{2}$ inches, length over all, price, each.....1.85
- No. 4 Size of cutter $\frac{3}{4} \times 4$ inches, length over all, price, each.....1.95
- Set of three Nos. 1, 2 and 3, price, per set.....3.95
- Set of four, price, per set.....4.95

VLCHEK NON-CHATTERING

This is the most perfect bearing scraper made. Hand forged from high grade tool steel, ground sharp edges, and positively nonchattering. A leather pocket is put on the blade of each one to insure protection to the edges.

No. 550 Polished Blades, Ebony Shank, Price per set... \$2.50

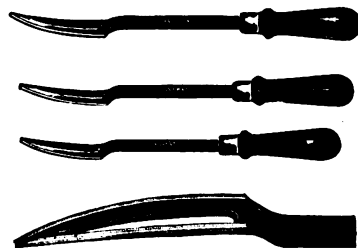


FIG. 804

STANLEY SCREW DRIVERS**LITTLE MASCOT**

FIG. 4014

Blade is one piece of steel and carefully tempered. Fluted handle. Stained black.

No. 121—Blade, inch.....	1½	3
Weight per dozen lbs.....	¼	½
Price, per dozen.....	\$2.00	\$2.25

BABY HURWOOD

Blade, Shank and Head are one piece of special steel. Fluted Handle stained black.
 No. 21—1½ in. Blade. Diameter ⅜ in., Length 4 inches over all. Weight per Dozen, 6 lbs.
 Price, per dozen.....\$3.30



FIG. 813

HURWOOD, MACHINISTS'

Especially adapted for heavy work where a long driver cannot be conveniently used. Nos. 51½, 52½ and 53½ are made with a hexagon shank for use with a wrench. The handles are fluted and stained black.



REGULAR—FIG. 4018

Number.....	51	52	53
Length blade, in.....	1¾	3	4
Diameter of shank, in.....	¾	⅞	½
Tip, in.....	⅜	⅜	½
Length over all, in.....	5¼	7¼	9½
Price, per dozen.....	\$4.95	\$9.00	\$11.80



HEXAGON SHANK—FIG. 4019

Number.....	51½	52½	53½
Length blade, in.....	1½	2⅝	3¼
Diameter of shank, in.....	¾	⅞	½
Tip, in.....	⅜	⅜	½
Length over all, in.....	5½	7½	9½
Price, per dozen.....	\$7.80	\$11.80	\$14.70

HURWOOD, MACHINISTS'**DOUBLE GRIP HANDLE NO. 54**

FIG. 812

Made especially for heavy work. Double Grip Handle, Hexagon Shank, otherwise same as above.

No. 54—10-in. Blade, Diameter ½ in., Extreme Length, 18 in. Weight per Doz., 22 lbs.....Price per Dozen \$29.55

HURWOOD, ELECTRICIANS'**NOS. 50 AND 55**

FIG. 811

In the No. 50 the blade runs clear through the handle. In the No. 55 the end is insulated.

Made for light and delicate work. Blades made of small stock with tapered tips. Blade, Shank and Head are one solid piece of special steel, with rivet. Handle is insulated, fluted and stained black.

Length Blade, in.....	2½	3	4	5	6
Diameter of Shank, in.....	⅜	⅜	⅜	⅜	⅜
Weight per Dozen, lbs.....	1½	2	3	4	5
Price, per Dozen.....	\$2.40	\$3.00	\$3.60	\$4.20	\$4.80

STANLEY SCREW DRIVERS

HURWOOD, CABINET-MAKERS'

NO. 40



FIG. 810

Sides of Tip are parallel, being same width as shank. Blade, Shank and Head are one solid piece of special steel. Rivet passes through ferrule, handle and shank. Handles are fluted and stained black.

Length Blade, in.....	3	4	5	6
Diameter of Shank, in.	$\frac{7}{8}$	$\frac{7}{8}$	$\frac{7}{8}$	$\frac{1}{4}$
Weight per Dozen, lbs.....	2	3	$5\frac{1}{2}$	7
Per Dozen.....	\$3.80	\$4.55	\$5.40	\$6.45

HURWOOD, REGULAR

NO. 20



FIG. 809

Blade Head and Shank are one piece of Special Steel; Blade is securely fastened to Handle; Rivet passes through Ferrule, Handle and Shank. Black-Stained Fluted Handle.

Length Blade, in.....	$2\frac{1}{2}$	3	4	5	6	8	10	12	18	24
Weight per Dozen, lbs.....	$1\frac{1}{2}$	$1\frac{3}{4}$	$2\frac{3}{4}$	$4\frac{1}{4}$	6	$7\frac{1}{2}$	$8\frac{1}{2}$	$9\frac{1}{2}$	21	$9\frac{1}{2}$
Price per Dozen	\$3.30	\$3.80	\$4.55	\$5.40	\$6.45	\$7.95	\$9.95	\$11.80	\$18.00	\$24.55

PERFECT HANDLE SCREW DRIVERS

The handles of the Perfect Handle Screw Drivers are treated with a special waterproofing process which renders them impervious to water. The oval shape handle gives a greater leverage and fits the hand better than common round handles.

REGULAR

No. 609—One Piece Drop Forging from Hammer Head to Driver Tip, Oval Handle, Waterproofed, Finish in Natural Color, Well Balanced and Tempered.



FIG. 818



FIG. 819

Length of Blade, In.	2	$2\frac{1}{2}$	3	4	5	6	7	8	10	12
Diam. of Blade, In.	$\frac{1}{4}$	$\frac{1}{4}$	$\frac{1}{4}$	$\frac{1}{4}$	$\frac{1}{4}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{3}{8}$	$\frac{3}{8}$	$\frac{3}{8}$
Price per Dozen ..	\$3.50	\$3.70	\$4.00	\$4.25	\$5.00	\$6.00	\$7.00	\$8.00	\$10.00	\$12.00

MACHINISTS'

No. 610—One Piece Drop Forging from Hammer Head to Driver Tip, Square Shank, Oval Handle, Waterproofed, Finished in Natural Color.



Number.....	$9\frac{1}{2}$	$10\frac{1}{2}$
Length, Inches.....	$4\frac{1}{2}$	5
Size of Square, Inches.....	$\frac{1}{2}$	$\frac{1}{2}$
Width at Point, Inches.....	$\frac{1}{2}$	$\frac{1}{4}$
Price per Dozen	\$12.00	\$13.00

FIG. 820

Put a wrench onto the Square Shank when you want to tighten or loosen cap screws, set screws, etc. It will stand strain.

YANKEE SCREW DRIVERS

PLAIN, STANDARD STYLE

FIG. 814

No. 90—Finely Polished Steel Blades and Ferrules, Hardwood Handle, Dull Dead Black Finish.

Length of Blade, Inches.	1½	2	3	4	5	6
Ap. Wt. Per Dozen, Lbs.	1	1¼	1½	2¾	4	4¼
Price per Dozen	\$3.50	3.50	3.75	4.50	5.50	6.50

Length of Blade, Inches.	7	8	9	10	12
Ap. Wt. Per Dozen, Lbs.	6	6¼	6¾	9½	10½
Price per Dozen	\$7.50	9.00	9.35	11.00	12.30

PLAIN, CABINET STYLE

FIG. 815

No. 95—Finely Polished Steel Blades and Ferrules, Hardwood Handles, Dull Dead Black Finish.

Length of Blade, Inches.	2½	3½	4½	5½	6½	7½
Ap. Wt. Per Dozen, Lbs.	1¾	1¾	1½	1¾	1¾	2¾
Price per Dozen	\$3.50	3.75	4.50	5.50	5.65	6.25

Length of Blade, Inches.	8½	9½	10½	12½	15½
Ap. Wt. Per Dozen, Lbs.	2¾	2¾	2¾	3¼	3¾
Price per Dozen	\$6.90	7.50	8.30	9.45	11.30

GENUINE CHAMPION SCREW DRIVERS

This blade is forged from the toughest steel, tempered with great care, and shrunk into a solid malleable bolster which rests on heavy ferrule, while tang (which forms a part of the bolster) enters and passes nearly through the handle.

CABINET



FIG. 816

Length, in.	2½	3½	4½	5½	6½	8½	10½	12½
Weight, lbs.	1½	1½	1¾	1¾	2	2	2¼	2½
Price, per doz.	\$3.00	3.50	4.50	5.50	6.50	8.00	9.50	11.00

REGULAR



FIG. 817

Construction same as Champion Cabinet, but with heavier blade.

Length, in.	2½	3	4	5	6
Weight, lbs. per doz.	2	2½	3	4	5
Price, per doz.	\$3.00	3.50	4.25	5.00	6.00

Length, in.	7	8	9	10	12
Weight, lbs. per doz.	6¼	7	8	9½	11
Price, per doz.	\$7.00	8.00	9.00	10.00	12.00

YANKEE RATCHET SCREW DRIVERS

RIGHT AND LEFT HAND, AND RIGID

The friction in ratchet mechanism is so slight as to be hardly felt, the backward movement is as easy as in a good stem-winder, and just as noiseless. The construction of ratchet and pawls is such that neither can bend, break, wear or get out of order.

The bits are forged from best cast steel, properly tempered, ground and polished, and every bit is thoroughly tested before leaving factory. Other metal parts are nickel-plated and buffed. The handles are made of hard wood, smoothly and handsomely polished.



FIG. 4015

No. 11—Adjustment for right and left hand is made by slide moved across length of blade.

Length of blade, inches.	2	3	4	5	6	8	10	12
Weight, lbs., per doz.	1½	2¾	3	3½	4¾	5¼	6¾	7¼
Price, per doz.	\$6.75	8.75	9.25	10.00	12.00	13.75	16.00	17.60

YANKEE RATCHET SCREW DRIVERS

RIGHT AND LEFT HAND AND RIGID

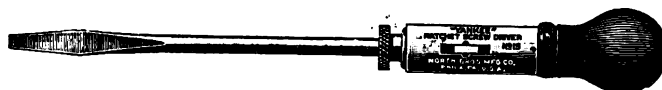


FIG. 4016

No. 15—Same description as No. 11, on page 251. All sizes have $\frac{1}{8}$ diameter blade. On the blade is a knurled washer so blade can be turned with finger and thumb while hand presses on handle to hold screw in place. Largely used by electrical workers.

Length of blade, inches.....	2	3	4	5	6	8
Net weight, lbs., per doz.....	1 $\frac{3}{8}$	1 $\frac{1}{2}$	1 $\frac{1}{2}$	1 $\frac{5}{8}$	1 $\frac{5}{8}$	1 $\frac{5}{8}$
Price per doz.....	\$8.20	\$8.35	\$8.75	\$9.10	\$9.50	\$10.00

YANKEE SPIRAL RATCHET SCREW DRIVERS



FIG. 822

NO. 30. REGULAR PATTERN, RIGHT AND LEFT HAND, AND RIGID

This is the standard size. It drives or draws screws by pushing on handle, or by ratchet movement of handle, and can be made rigid as an ordinary screw driver by an ingenious locking device when closed. Its advantage over all similar tools is its greater simplicity, compactness, strength, durability and easy operation. Three bits of different widths are included with each tool. The extreme length of tool with bit in chuck is 13 $\frac{1}{2}$ in. when closed and 19 $\frac{1}{4}$ in. when extended.

Price, per dozen..... \$33.

NO. 31. HEAVY PATTERN

This tool is of same design as No. 30, but is made considerably heavier and stronger throughout, for use in car shops, etc. where heavy screws are required to be driven or drawn.

Three bits of different widths are included with each tool. The extreme length of tool with bit in chuck is 17 $\frac{1}{2}$ inches when closed, and 26 $\frac{1}{4}$ inches when extended.

Price, per dozen..... \$48.

Extra screw driver bits in sets of 3, for Nos. 30 and 31 Yankee screw drivers, price per set.....

YANKEE QUICK RETURN SPIRAL RATCHET SCREW DRIVERS

RIGHT AND LEFT HAND, AND RIGID



FIG. 823

NO. 130

This is the regular pattern No. 30 with a spring added in handle as shown in cut, which causes the handle to come back the next push, in driving screws in or out.

It is a "quick return" and more rapid as well as convenient in practical use, than pulling the handle back.

It can be successfully used with only one hand driving the tool, as the spring keeps bit in position as it forces the handle back for the next stroke. It takes the same bits and attachments as the No. 30 "Yankee" Spiral Ratchet Driver.

The extreme length of tool with bit in chuck is 20 $\frac{1}{2}$ inches when extended, and 15 inches when closed.

Price, per doz..... \$38

NO. 131

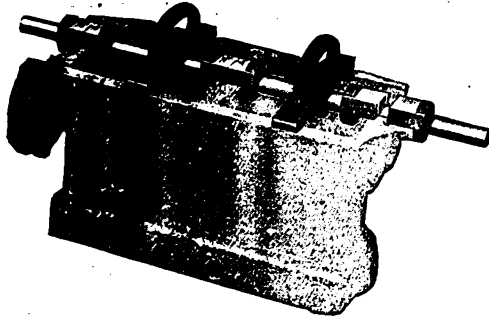
This is the heavy pattern (No. 31) with spring added in the handle, as shown in the cut above. It is similar in construction to the No. 130 throughout, but larger and stronger, corresponding to No. 31.

Price, per doz..... \$50

Extra screw driver bits for Nos. 130 or 131, set of 3 bits, price per set.....

UNIVERSAL MAIN BEARING REPLACEMENT EQUIPMENT

FOR FORDS AND FORDSONS



BABBITTING JIG ON FORD MODEL
FIG. 4063

Every repair shop should be equipped with a Universal bearing equipment.

With this equipment it is no longer necessary to send a block away for bearing replacements and compel the owner to be without his car for several days, or even weeks.

With the Universal equipment, the car can be out the same day, it requiring only twenty minutes' actual work by any good mechanic to complete the bearing job.

The Babbitting jig is self-aligning, and is made up of three patented split bearing moulds and a bar. The moulds do not require clamps to hold them in place. The jig provides $\frac{3}{4}$ of an inch of metal for finishing all bearings.

The patented moulds are so constructed as to prevent the babbit flowing any place except to form the bearing. When the metal is solid, there is no cutting or chiselling necessary to release the jig.

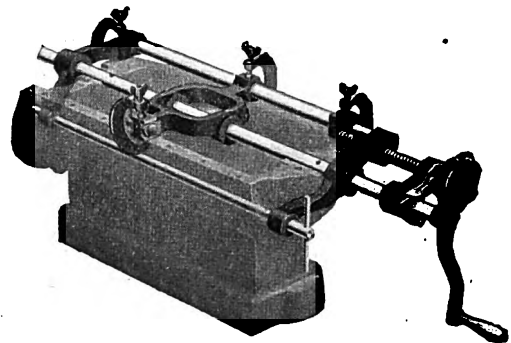
The fixture which aligns the boring bar is so arranged that it gets its location from the cam-shaft holes. This is accomplished by a solid bar extending the entire length of the cylinder casting, assuring absolute accuracy. This is done by passing the bar through the boring bar support and the cam-shaft bearing holes—the only method, in the minds of the leading engineers, which can be depended upon.

The boring bar is provided with three cutters so arranged and secured that all three bearings are machined in one operation.

Each outfit includes a furnace, metal pot, two ladles, a patented babbitting jig, and a patented self-aligning boring bar and clamps. The babbitting jigs and boring bars are furnished in substantial tool chests.

The Fordson tractor and Ford Model T combination equipment has separate babbitting jigs, but the boring bar and fixture is interchangeable, having two boring bars—one for the tractor and another for the Ford Model T. These fit in the same fixture, the difference being made up by bushing.

The fixture is provided with two cam-shaft holes to accommodate either the tractor or Ford Model T, thus insuring perfect alignment when operating on either casting. The main bearings in the Ford Model T and Fordson tractor motors can be babbitted and bored perfectly by the average mechanic in from twenty to thirty minutes.



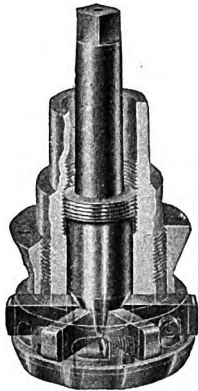
BORING BAR ON FORD MODEL
"T" BLOCK—FIG. 4064

PRICES

Equipment A complete (for Fords) on application.
Equipment B complete (for Fordsons) on application.
Equipment C complete (for Fords and Fordsons) on application.

UNIVERSAL CYLINDER REBORING TOOLS

FOR AUTOMOBILE, TRUCK, TRACTOR, STATIONARY, MARINE AND AEROPLANE ENGINES



**CUTTER HEAD SHOWING
SIMPLICITY OF UNIVERSAL ADJUSTER**
FIG. 4067

The new tool is intended to be used either by hand or under a drill press, and on detachable head cylinders the reboring can be done without removing the cylinder block from the car. One of the most important features of the Universal Cylinder Reboring Tool is its universal adjustment, whereby the operator can set the cutters at any desired size within $\frac{1}{2}$ -1000 of an inch.

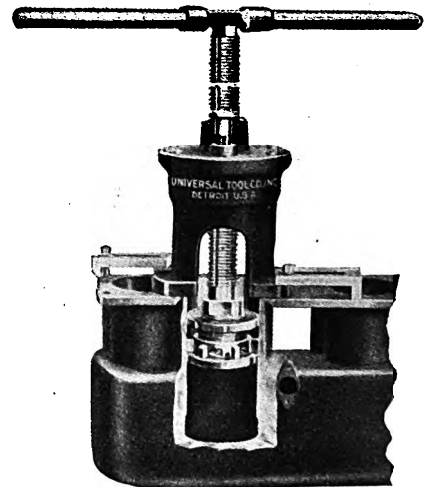
It is as simple in design as it is effective in operation. There is a cutter head with 6 cutter surfaces, all adjustable in unison. A bevel expansion ring is fitted into the cylinder which is to be rebored, and the bevel pilot head acts as a centralizing medium. Has an over-sized securing ring which follows in the new cut, insuring rigidity and true centering.



FIG. 4068

The new model Universal Cylinder Reboring Tool is designed to rebore practically all makes of automobile, tractor, stationary, marine or aeroplane engines, whether open or closed end cylinders, and will rebore a true, round, straight bore.

Deep scores or connecting rod clearances have no effect on the operation, it being particularly designed to overcome these items.



**IN OPERATION ON
CLOSED END CYLINDER**
FIG. 4068

The tool is shipped, packed in a finished, hardwood chest. There is a compartment for every part of the tool.

A large sheet of instructions in detail, completely illustrated and an inventory list of tool parts is pasted on the inside of the top of the chest.

This greatly reduces the possibility of parts of the tools becoming lost or damaged.

All parts are interchangeable. You can increase the range of any unit, except the No. 2, by the addition of a few standard parts.

Note range of No. 5 tool.

It is not necessary to purchase a special tool for any special make of cylinder. For illustration:

The purchaser of a No. 3 tool can rebore Ford, Dodge or Fordson cylinders or cylinders on any other car having cylinders within the range of $3\frac{1}{8}$ to $4\frac{1}{8}$.

The Universal Tool will rebore cylinders on any make of car that comes within its range of expansion.

SPECIFICATIONS AND PRICES

No.	Range Inches	Price Each	No.	Range Inches	Price Each	
00	$3\frac{3}{4}$ to $4\frac{1}{8}$	\$140.00	3	$3\frac{1}{8}$ to $4\frac{1}{8}$	\$160.50	*Fordson Tractor and Ford Model T.
1	**	133.75	4	$3\frac{1}{4}$ to $5\frac{1}{8}$	160.50	**Ford special. †Dodge special.
A-1	†	140.00	5	$2\frac{1}{2}$ to $5\frac{1}{8}$	240.75	Price, small head attachment for No. 3 machine, $2\frac{1}{2}$ to $3\frac{1}{8}$ range, each \$53.8
2	$2\frac{1}{2}$ to $3\frac{1}{4}$	160.50				Price, small head attachment for No. 4 machine, $2\frac{1}{2}$ to $3\frac{1}{4}$ range, each 80.2

VLCHEK VALVE LIFTER

DROP-FORGED

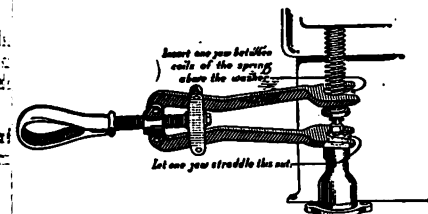


FIG. 911

The sliding cam increases the leverage as the valve spring is compressed and allows quick action with greatest ease.

Price, each..... \$1.50

MAPSON PERFECTION VALVE LIFTER

Easily operated by one man on any car or truck built with T or L Head Motor. Very little effort is required to compress the stiffest valve spring. The action is all above the cylinder heads. The operator can feel every ounce of pressure exerted. Perfect vertical action cannot injure the valve stem. Spring is held securely at desired point by automatically locking ratchet. Operator's hands are free to remove retaining pin or washer.

Can also furnish a heavy duty type made especially for trucks, tractors and fire engines.

Regular Type, List Price, each..... \$ 6.50

Heavy Duty Type, List Price, each..... 12.50

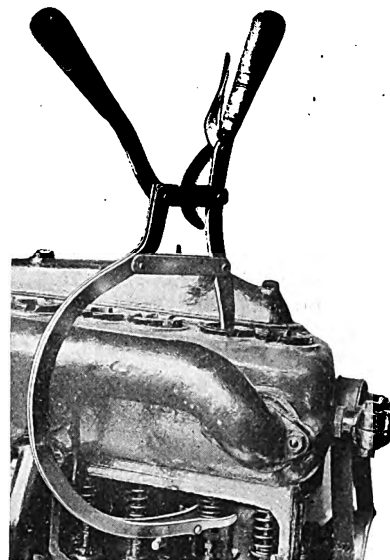


FIG. 4022

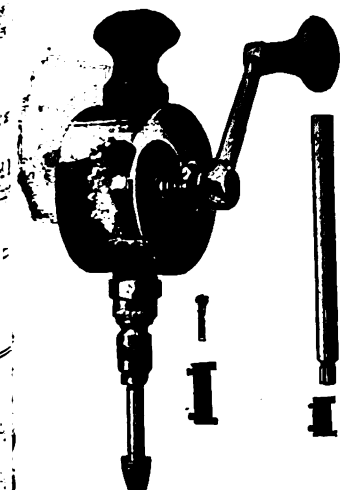


FIG. 900

SIOUX VALVE GRINDER

The Sioux Valve Grinder meets every requirement of a mechanically efficient tool. By continuous movement of the handle in one direction, the valve is given a reciprocating motion, always traveling slightly forward in one direction then in the opposite, thereby producing the motion that is absolutely necessary for perfect valve grinding.

The hand grip is close to the crank center, thereby relieving the valve of the side strain that tends to cause irregularities in cutting.

Easy action is attained through ball bearings, and serviceability and durability by use of the best material and accurate workmanship.

No. 400 List Price, complete..... \$6.00

THE VELTUM PNEUMATIC VALVE GRINDER

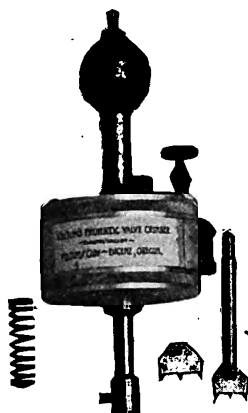


FIG. 4024

Will operate on 15 to 500 pounds of air. Will grind valves up to 4 inches in diameter. Body of special aluminum alloy, all other parts of steel, case hardened and ground to a finish.

Speed from 50 to 1000 strokes per minute, eliminating going over valve second time for perfect seal.

It is just as easy to grind the valve cages as the valve, and this in most cases is just as essential as the valves.

Add a small drill chuck at a few cents' cost and the flexibility of the Valve Grinder will allow you to do very delicate work, such as grinding carburetors, float valve stems, and the valves in the Stewart Vacuum gasoline system.

Veltum's Pneumatic will grind valves which have no provision for tool to fit in on head by just removing tool shank and inserting end of valve stem direct into main shaft of valve grinding machine, and continue same as if one had machine on top of valve.

Price, each.....\$30.00

REPAIR PARTS FOR VELTUM PNEUMATIC GRINDER

ORDER PARTS BY NUMBER

1. Hose Connection.....	\$0.40	17. Cam.....	\$1.85
2-8-9. Housing, not sold separate.....	15.05	18. Cam Shaft.....	1.75
3. Throttle.....	.75	19. Valve Chest Cover Plate	1.00
4. Throttle Packing Gland	.20	20. Valve Chest Cover Plate	
5. Push Rod Coil Spring..	.15	Screws, 4 in machine..	.10
6. Push Rod.....	.75	21-22-23. Complete Set of	
7. Body Screws, 6 in machine.....	.10	Bits.....	.75
10. Connecting Rods, 2 in machine.....	2.00	24. Bit Clamping Screw....	.05
11. Brass Pistons, 2 in machine.....	.40	25. Bit Stock.....	.36
12. Piston Packing Cup		26. Retrieving Spring.....	.18
Leather, 2 in machine	.25		
13. Main Shaft.....	2.75	EXTRA TOOLS—Not included	
14. Bit Stock Clamping		with machine	
Screw.....	.05	27A. Extension Bit Stock...	.70
15. Valve.....	1.00	28B-32F-31E. Cage Clamping	
16. Valve Retaining Spring.	.10	Mandrel.....	.70
		29C-30D. Valve Stem	
		Chuck.....	.70
		These extra tools per set of	
		three.....	2.00

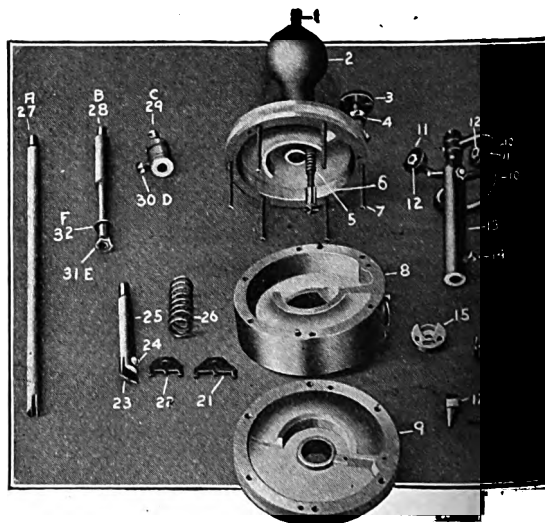


FIG. 4025

G.-P. VALVE GRINDERS

NO. 288

By means of a simple operating mechanism, the Spindle is caused to rotate back and forth while the Crank is turned continuously in one direction. The cast iron Casing, in which the working parts are inclosed for protection, gives the tool sufficient weight so that additional pressure need not be applied to the valve seat.

Each tool has a polished Hardwood Crank Handle and a Lignum-Vitae Head. The Frame is finished in red and black enamel.

Both an adjustable Spanner and a Blade are provided in order that the tool may be used on different types of cars.

Length over all, 10 $\frac{1}{4}$ inches. Net weight, 3 $\frac{1}{4}$ pounds.

Price, each.....\$4.25

NO. 467

This tool is the same as the No. 288, except that it has a handsomely polished Aluminum Frame. Net weight, 2 pounds.

Price, each.....\$6.00



FIG. 901

CRONES VALVE DRESSER AND RESEATER

Made from the finest steel. Superior workmanship. Carefully tested. Neatly boxed in strong oak case. Easily operated by hand.

For re-seating valves and valve-seats of automobiles or of any explosive engine. It cuts the valve true with a minimum loss of material, thus prolonging the life of the valve and giving all the advantages in power to be obtained by a perfect valve.

THE COMPLETE SET CONSISTS OF THE FOLLOWING:

Valve Dresser Head (complete).....	\$18.00	2" Reseater.....	\$2.20
Oak Case.....	2.00	2 1/8" Reseater.....	2.35
Spanner Wrench and Caliper.....	.40	2 1/4" Reseater.....	2.45
Brace Bit.....	.50	1 1/8" Pilot.....	.55
Follower.....	.50	1 1/4" Pilot.....	.55
Carrier.....	1.45	1 1/2" Pilot.....	.55
1 1/2" Reseater.....	1.75	3/8" Pilot.....	.55
1 3/8" Reseater.....	1.85	1/4" Pilot.....	.55
1 3/4" Reseater.....	2.00	Price complete set.....	\$38.20

Separate orders for parts accepted at above list.

When ordering, specify the size seat cutter and pilot stem. Valve dresser takes from 1 in. to 3 in. diameter valve and stem from 1/4 to 1 1/8.

CUTTERS AND PILOT STEMS

Size Inches	Price Each	Size Inches	Price Each	Size Inches	Price Each	Size Inches	Price Each
1 1/8	\$1.75	1 3/4	\$2.00	2 3/8	\$2.40	2 5/8	\$2.80
1 1/4	1.75	1 1/2	2.05	2 1/4	2.45	2 1/2	2.90
1 1/2	1.75	1 5/8	2.10	2 3/4	2.50	2 3/4	2.95
1 3/4	1.75	1 3/4	2.15	2 5/8	2.55	2 1/2	3.00
1 5/8	1.80	2	2.20	2 7/8	2.65	2 3/4	3.05
1 7/8	1.85	2 1/8	2.30	2 7/8	2.70	2 1/2	3.10
2	1.90	2 1/4	2.35	2 7/8	2.75	3	3.20

Pilot 1/4, 3/8, 1/2, 5/8, 3/4, 7/8, 1, 1 1/8, 1 1/4, 1 1/2, 1 3/4, 1 5/8, 1 3/4, 1 7/8, 2, 2 1/8, 2 1/4, 2 1/2, 2 3/4, 2 5/8, 2 7/8, 3, 1/2 inch, each.....\$0.55
 Pilot 1 1/8, 1 1/4 inch, each......70
 Pilot 1 1/2, 1 3/4 inch, each......75

We carry above cutters and pilot stems in stock, also some odd sized cutters, but can furnish dresser, cutter or pilot stem for any size valve desired. Prices on application.

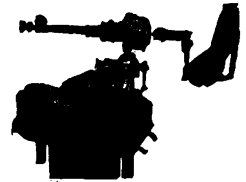


FIG. 906

SIoux STANDARD VALVE TOOLS

The Sioux valve tool set illustrated here is complete enough to take care of practically all the jobs that any average garage or auto repair shop is likely to get. It includes five reamers, for valves 1 1/8 to 2 1/4-inch diameter—and three pilot stems, 1/8, 3/8 and 1/2. The valve seat cutters are made on the reamer principle and are guaranteed to work with absolute accuracy and smoothness. Pilot stems are finished to accurate size. The reamer heads are furnished in three angles, 30, 45 and 60 degrees, and in any sizes to fit valves from 1 1/2 inches to 3 inches in diameter at special prices. Pilot stems are provided in all sizes.

Price of Sioux valve tool set as illustrated..... \$22.50

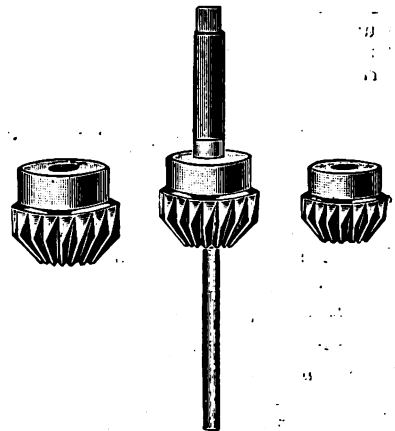


FIG. 904

SIoux VALVE SEAT REAMERS PRICES AND SIZES

No. 100—1 1/2 inch.....	\$2.50	No. 107—2 1/2 inch.....	\$2.75	No. 114—3 1/4 inch.....	\$4.50
No. 101—1 3/8 inch.....	2.50	No. 108—2 5/8 inch.....	3.00	No. 115—3 3/8 inch.....	4.75
No. 102—1 1/2 inch.....	2.50	No. 109—2 3/4 inch.....	3.25	No. 116—3 1/2 inch.....	5.00
No. 103—1 1/4 inch.....	2.50	No. 110—2 1/8 inch.....	3.50	No. 117—3 5/8 inch.....	5.25
No. 104—2 inch.....	2.50	No. 111—2 1/4 inch.....	3.75	No. 118—3 3/4 inch.....	5.50
No. 105—2 1/4 inch.....	2.75	No. 112—3 inch.....	4.00	No. 119—3 7/8 inch.....	5.75
No. 106—2 1/2 inch.....	2.75	No. 113—3 1/8 inch.....	4.25	No. 120—4 inch.....	6.00

SIoux PILOT STEMS

No. 120—1/8 inch.....	\$1.00	No. 123—1/4 inch.....	\$1.00	No. 126—5/8 inch.....	\$1.75	No. 128—3/4 inch.....	\$1.75
No. 121—3/8 inch.....	1.00	No. 124—1/2 inch.....	1.00	No. 127—1 1/4 inch.....	1.75	No. 129—1 1/2 inch.....	1.75
No. 122—1/2 inch.....	1.00	No. 125—3/4 inch.....	1.00				

DEXTER VALVE RESEATING MACHINES

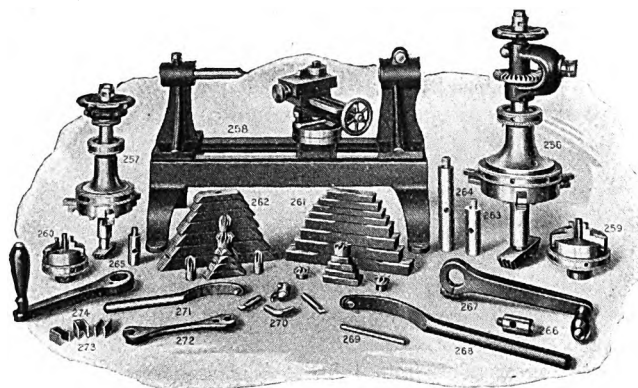


FIG. 908

Outfit No. 6 T-L, capacity for reseating valves $\frac{1}{4}$ " to 6".

Are known wherever valves are used and are the result of twenty-five years specializing in tools for repair of valves.

The Dexter Machines recut a worn valve seat and dis accurately making a perfectly tight valve that will hold water or steam. The same valve can be recut from ten to twenty times without removing from the pipe line. The saving of a few valves pays for a machine. Extensively used in mines, sugar mills, public institutions, railroads, ships and manufacturing plants.

OUTFITS FOR FLAT AND TAPER-SEATED GLOBE VALVES

Outfit Number	3 T-L	4 T-L	6 T-L	8 T-L	10 T-L	12 T-L
For Valves, sizes	$\frac{1}{4}$ -3	$\frac{1}{4}$ -4	$\frac{1}{4}$ -6	$\frac{1}{4}$ -8	$\frac{1}{4}$ -10	$\frac{1}{4}$ -12
Price	\$109.38	\$128.13	\$171.88	\$234.38	\$328.13	\$421.88

For price of Dexter Outfits with the Dexter disc cutter substituted for the T-L disc cutter deduct \$15.63 from above prices.

DEXTER PUMP VALVE RESEATING MACHINES

These machines recut the seats in all types of feedwater, circulating and service pumps.

PUMP OUTFITS USED INDEPENDENTLY OF DEXTER GLOBE VALVE MACHINES

Outfit Number	K-4	H-6	D-H-6	N-15
Capacity for refacing seats	2-3	2-4	2-7½	8-15
Price, without cutters	\$28.13	\$37.50	\$46.25	\$81.25

PUMP ATTACHMENTS USED WITH DEXTER GLOBE VALVE RESEATING MACHINES

M-4 and M-6 attachment with S. & W. Patent Pump Cutters will enable users of the Improved Dexter Valve Reseating Machines to reface the seats of all pump valves of standard makes of pumps having valves 2" to 4".

These attachments are designed to be used with the tool shaft and bearing sleeve of either a No. 3, No. 4, or No. 6 Dexter Globe Valve Reseating Machine of Improved Type manufactured since January 1, 1909, and no other.

D-M-6 attachment with S. & W. Patent Pump Cutters will enable users of the Improved Dexter Globe Valve Reseating Machine No. 6-T-L to reface the seats of all pump valves of standard makes of pumps having valves 2" to 7½".

This attachment is designed to be used with the tool shaft and bearing sleeve of the larger machine of the No. 6-T-L Globe Valve Reseating Machine manufactured since January 1, 1909.

Attachment Number	M-4	M-6	D-M-6
Capacity for refacing seats	2-3	2-4	2-7½
Price, without cutters	\$18.75	\$21.25	\$30.00

Add price of pump cutters required to price of pump outfit or attachment.

S. & W. PATENT PUMP VALVE SEAT CUTTERS

Size	2	2½	3	3½	4	4½	5	5½	6	6½
Price	\$15.00	\$15.00	\$15.00	\$18.75	\$18.75	\$18.75	\$22.50	\$22.50	\$22.50	\$27.50
Size	7	7½	8	10	12	14	15			
Price	\$27.50	\$27.50	\$37.50	\$62.50	\$81.25	\$93.75	\$100.00			

Give diameter of pump valve stem for each cutter.

Prices of Dexter Gate Valve Reseating Machines, capacity for refacing gate valves 1½" to 14", on request.

THE ECONOMIC VALVE RE-FACING TOOL

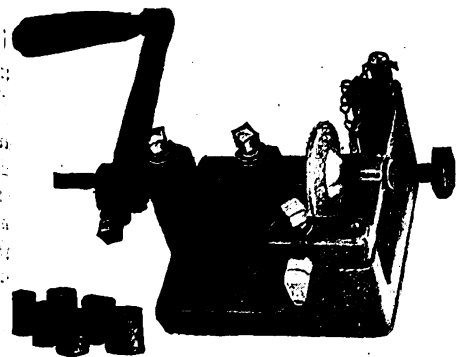


FIG. 907

This tool will be found very valuable in repair shops, garages, or to anyone desiring to keep their valves in perfect shape.

This tool is adjustable to any size valve up to 3 inches diameter. It can be held in bench vise or can be screwed to bench or wall or any convenient place, and do better and quicker work than a lathe, making a lathe unnecessary for this class of work.

This tool is furnished with a double-ended cutter, one end for standard 45-degree valves and the other end for standard 30-degree valves, and is so constructed that the valves come positively true with the stem when faced with this tool. It can be operated by anyone with the assurance of a quick and perfect job and a saving of 75 per cent of the time it would take to grind in valves without using this tool.

The cutter can be easily sharpened without changing degree of same.

Price, complete..... \$7.00

Extra Cutter, 75c each; Extra Bushing, 40c per set, each size.

THE ECONOMIC VALVE RE-SEATING TOOL

The Economic Valve Re-Seating Tool is furnished with 4 sets of blades, standard 45 degree angle and are all accurately ground and interchangeable. The sizes of cutters furnished will do valve seats $1\frac{1}{2}$ in., $1\frac{3}{4}$ in., 2 in. and $2\frac{1}{4}$ in. Blades of other degrees and lengths can be had to order when specified.

Also furnished with 4 pilot stems to fit the different size valve leads. The cut shows its positive and rigid construction, which insures perfect work.

It is much cheaper than solid reamers and gives equally good results.

Easy to sharpen without changing degree or length of blades. Can be made to any size or degree at a very low cost, which makes for ECONOMY. Blades can be changed in a few seconds. Workmanship and materials are of the highest grade. Cross handle can be removed so tool can be operated by carpenters' brace or drill press.

Price Complete..... \$8.00

Extra Pilot Stems.....each .25

Extra Cutters, any degree or size to 3-inch, inclusive.....Per Set \$0.75

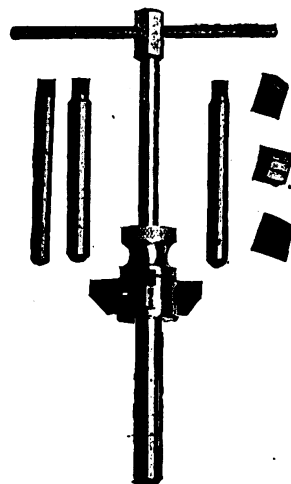


FIG. 902

VALVE GRINDING COMPOUND

VOLCANO



FIG. 917

FINE, MEDIUM OR COARSE

Co. 2 Size, approximate weight 3 oz.....	\$0.25
Co. 3 Size, approximate weight 8 oz.....	.50
Co. 4 Size, approximate weight 1 lb.....	1.00
Can contains one grade only.	

VOLCANO is a chemical formula, and does not contain either oil or grease.

Saves 50 per cent over old method compounds, because all ingredients are of a cutting nature. No lubricants used.

Leaves a superior finish, because it will not cut rings and works evenly on valve and seat.

For unusual work, such as badly pitted or burnt valves.

For brass pet cocks, needle valves or soft metal valves, try Fine or Special Extra Fine grade.

For piston lapping, Volcano cannot be equaled. Easily cleaned from metal by using dampened cloth.

Never add oil, coal oil or gasoline to Volcano. Add water if contents of can need thinning.

VALVE GRINDING COMPOUND

CARBORUNDUM

CARBORUNDUM valve-grinding compound is a mixture of fast-cutting Carborundum grains and a high-grade grease. The compound gives a true, clean valve and seat in all motor engine valves in but a fraction of the time required by other mediums.



FIG. 914

Carborundum Valve Grinding Compound is put up in a combination can which is divided into two compartments, each containing two ounces, one compartment for fine compound and the other for coarse compound. This can is most convenient for car owners, motorcyclists or motorboat owners, and contains a liberal quantity of two grits in one package.

No. 277 per can\$0.50

Carborundum Valve Grinding Compound is also sold in cans containing one or five pounds of either the coarse or fine compound, for convenience of garage and repair stations, shops, etc.

	Price Cans
Carborundum Valve Grinding Compound, in pound cans, coarse or fine.....	\$1.25
Carborundum Valve Grinding Compound, in five-pound cans, coarse or fine.....	5.00

CARBORUNDUM VALVE GRINDING GRAINS (DRY)

For repair shop and garage use, many prefer to mix their own valve grinding compound. Powdered carborundum is ideal for this purpose.

One Pound Cans.....	Each	\$0.50
Five Pound Cans.....	"	2.50

Specify whether Coarse or Fine wanted.



FIG. 915



FIG. 916

IN COLLAPSIBLE TUBES

One dozen tubes of Carborundum valve-grinding compound are put up in an attractive display carton for window or counter use. The tubes contain fine or coarse compounds, as desired. The carton is given with order for two dozen tubes.

Price per Tube.....	\$0.30
Price 1 doz. Tubes on Stand.....	4.20

CLOVER BRAND

A Patented mixture of Petroleum, Hard Oil and Abrasive for grinding valves, crankshafts, pistons into cylinders, etc.

SOME USES FOR CLOVER COMPOUND AND GRADES RECOMMENDED:

Grinding Valves: C or D for roughing, and A for finishing.
Grinding Crank Shafts into Bearings: I-A or A.
Grinding Pistons into Cylinders: Grades A or B.
Polishing Crank Shafts or Arbors: A or I-A.
Running Together Gearing: A or B.
Grinding Brass Cocks: I-A or A.
Lapping-out Cylinders: Grade A.

Size	Grades	Price Each
2 oz. Duplex Cans.....	C & A	\$0.30
4 oz. Duplex Cans.....	C & A	.50
1 lb. Cans.....	A-I-A-B-C-D or E	1.50
I-A—very fine; A, B, C, D and E—very coarse.		



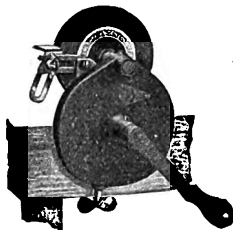
FIG. 918

CARBORUNDUM NIAGARA TOOL GRINDERS

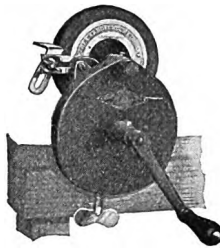
GRAY IRON GEAR CASE, ACCURATELY FITTED OIL-TIGHT, CUT GEARS, MALLEABLE IRON HANDLE AND THUMB SCREW CLAMP, SMALL PARTS NICKEL PLATED, FITTED WITH CARBORUNDUM WHEEL



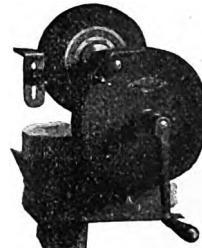
NO. 1—FIG. 1057



NO. 2—FIG. 1058



NO. 3—FIG. 1059



NO. 4—FIG. 1060

THE NO. 1 GRINDER

Is especially adapted for hotels, restaurants, butcher shops and household use, small and compact, smooth running and practically noiseless.

THE NO. 2 GRINDER

Is larger and more powerful than the No. 1. Adaptable for carpenters use; small machine or repair shops, woodworking plants or garages.

THE NO. 3 GRINDER

Is larger and more powerful than the No. 2; can be conveniently carried in a carpenter's tool box, also sufficiently powerful for use in shops.

THE NO. 4 GRINDER

Is large and sufficiently powerful for general machine shops, repair shops, garages or woodworking plants where a power driven grinder is not available.

SPECIFICATIONS AND PRICES

Number	1	2	3	4
Diam. of wheel, in.	4	5	6	7 $\frac{3}{8}$
Thickness of wheel, in.	1	1	1	1 $\frac{1}{4}$
Diam. hole, inches	$\frac{3}{8}$	$\frac{3}{8}$	$\frac{3}{8}$	1 $\frac{1}{2}$
Weight each, lbs.	10	11 $\frac{1}{2}$	14 $\frac{1}{2}$	26
Price, each	\$5.31	\$7.50	\$10.00	\$13.75

TWIST DRILL ATTACHMENT

NO. 23



FIG. 1062

Every small shop, garage and repair station should have a good practical device for grinding and pointing drills. The No. 23 Twist Drill Attachment, built for the No. 3 or No. 4 Carborundum Niagara Grinder, is mechanically right and a wide range of drills can be properly ground with it.

Price, each..... \$3.44

FOOT-POWER ATTACHMENT

NOS. 20 AND 21

The foot-power attachment can be fitted to either No. 3 or No. 4 Niagara Grinder. The attachment is simple and powerful and can be used to advantage where electric or other power not available. The attachment is made of malleable iron and strong and durable. It is readily adjusted to several heights. The illustration shows attachment fitted to No. 4 Grinder.

No. 20, Niagara Foot-Power Attachment for No. 3 Grinder.

No. 21, Niagara Foot-Power Attachment for No. 4 Grinder.

Price, each..... \$2.81



FIG. 1063

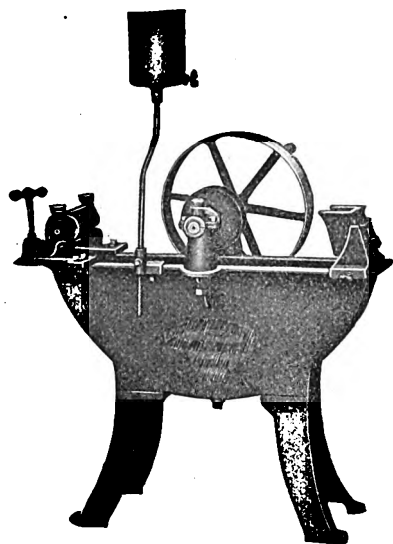


FIG. 919

EMPIRE, ROLLER BEARING

Cast Iron Frame and Trough, Green Painted, Patent Detachable Fixtures, Steel Shaft, Roller Bearing, with 12x2¼ in. Pulley and Crank.

Height of Frame 23 in., Length 32½ in., with Stone, 24 in. Diameter, 2 to 3½ in. Thick Each **\$30.00**

Weight Complete About 225 Pounds.

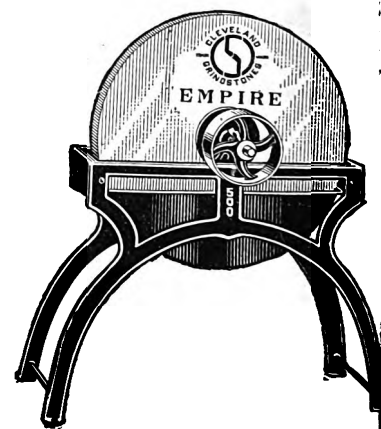


FIG. 920

KEYSTONE**ALL FITTED WITH PATENT DETACHABLE FIXTURES**

One piece cast iron trough, cast iron legs, securely fastened with two wrought iron bolts, adjustable tool rest with drop pan, patent detachable fixtures. With 12 inch diameter, 4 inch face pulleys.

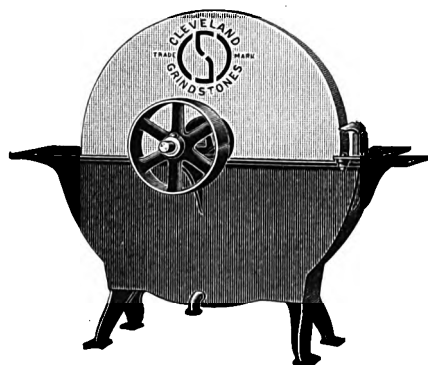


FIG. 921

Number	Diameter of Stone Inches	Thickness of Stone Inches	Size of Shaft at Bearings Inches	Price Complete with Stone	Price of Frame with Shaft Pulley and Tool Rest	Price of Frame only without Shaft, Bearings or Tool Rest
No. 508 K	50	7½ to 8	1¾	\$160.00	\$104.00	\$70.00
No. 506 K	50	5½ to 6	1¾	140.00		
No. 488 K	48	7½ to 8	1¾	150.00		
No. 486 K	48	5½ to 6	1½	136.00		
No. 485 K	48	4½ to 5	1½	132.00		
No. 466 K	46	5½ to 6	1½	134.00		
No. 465 K	46	4½ to 5	1½	130.00	78.00	56.00
No. 406 K	40	5½ to 6	1½	102.00		
No. 405 K	40	4½ to 5	1½	98.00		
No. 386 K	38	5½ to 6	1½	100.00		
No. 385 K	38	4½ to 5	1½	96.00		
No. 366 K	36	5½ to 6	1½	98.00		
No. 365 K	36	4½ to 5	1½	94.00	66.00	42.00
No. 364 K	36	4 to 4½	1½	92.00		
No. 305 K	30	4½	1	78.00		
No. 304 K	30	4	1	76.00		
No. 303 K	30	3½	1	74.00	No. 300 K	
No. 302 K	30	3	1	73.00		

Shipping Weight No. 100K Frame and Fixture, 700 lbs.; No. 200K, 450 lbs. No. 300K, 250 lbs. Can substitute any required size pulley at additional cost.

DETACHABLE GRINDSTONE FIXTURES

FOR POWER USE

Made of steel, the bearings are bored out for babbit, and the whole neatly finished.

The advantage of this fixture is the ease with which it is put into the stone and adjusted so as to make the stone run true. By its use customers can return the hub when stone is worn out and receive a new stone from the quarry absolutely ready for use, thus avoiding all the dust, dirt and laborious work of hanging and truing a grindstone.

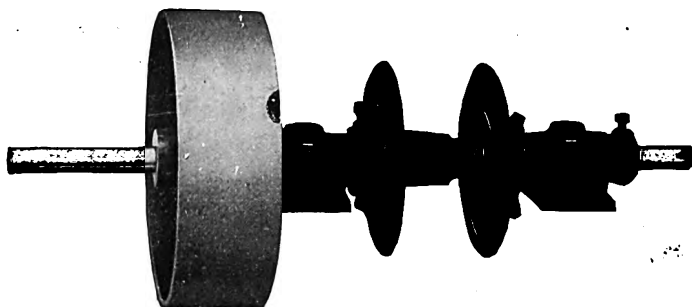


FIG. 922

ORDER BY NUMBER.

PRICE LIST

	Shaft		Will Hang Stone		Price Complete Without Pulley
	Diam. Inch.	Length	Diameter	Thickness	
No. 61.....	2	2 ft. 6 in.	6 ft. 0 in.x6 in. to 10 in.		\$31.60
No. 62.....	1 3/4	2 ft. 6 in.	5 ft. 0 in.x5 in. to 9 in.		25.00
No. 63.....	1 1/2	2 ft. 6 in.	4 ft. 0 in.x4 in. to 6 in.		19.00
No. 64.....	1 1/4	2 ft. 4 in.	3 ft. 0 in.x3 in. to 6 in.		14.00
No. 65.....	1	2 ft. 4 in.	2 ft. 6 in.x2 in. to 5 in.		12.50

Special prices given for pulleys when desired.

We are prepared to furnish any grade of grindstone fitted with this patent fixture, turned true, ready to hang, adding a small charge to cost of stone and fixture, for labor of applying.

LOOSE GRINDSTONES

PRICES ON APPLICATION

APPROXIMATE WEIGHT OF STONES

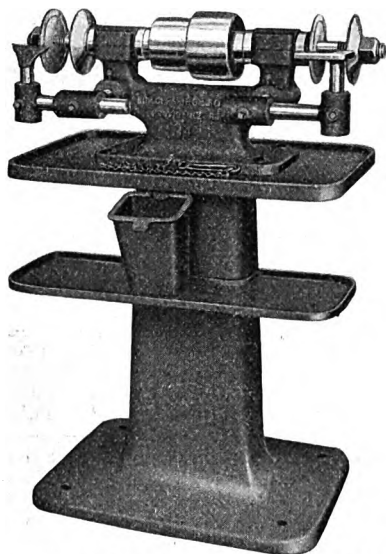
Diameter, Inches.....	18	20	22	24	26	28	30	32	34	36
1 1/2 in. Thick.....	30	40	45	60	70	82	95	108	120	136
1 3/4 in. Thick.....	35	45	50	70	83	96	110	120	142	160
2 in. Thick.....	40	55	60	80	95	110	128	143	162	180
2 1/4 in. Thick.....	50	60	70	90	105	125	140	160	182	200
2 1/2 in. Thick.....	60	70	80	100	118	140	157	179	202	226
2 3/4 in. Thick.....	...	80	90	110	130	150	173	197	222	250
3 in. Thick.....	...	...	100	120	145	165	190	215	243	275
3 1/2 in. Thick.....	...	...	...	140	165	195	220	250	283	320
4 in. Thick.....	...	...	...	160	190	220	252	287	323	365

Estimate Weight of Larger Stones on Basis of 155 Lbs. Per Cubic Foot.

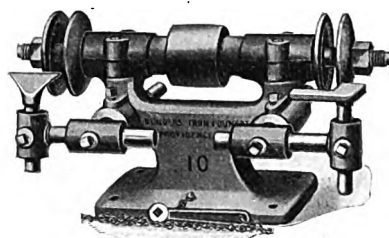
FIG. 923

BUILDERS GRINDERS

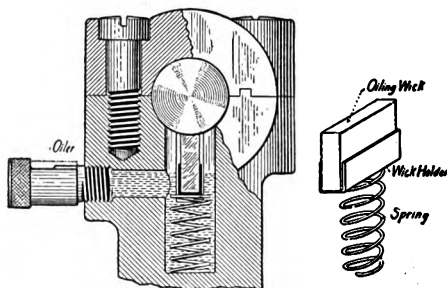
SEVEN SIZES, THE LARGEST USING WHEELS 24 IN. IN DIAMETER AND 4 IN. FACE



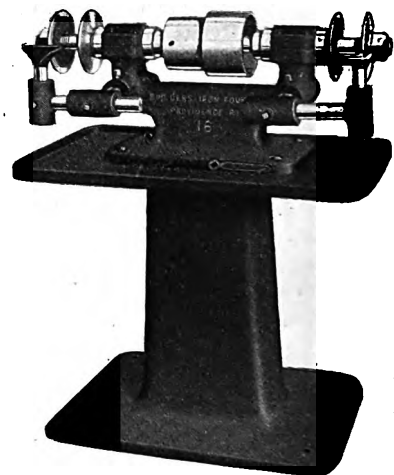
14 INCH GRINDER HEAD ON COLUMN
FIG. 924



10 INCH GRINDER HEAD
FIG. 925



SELF-OILING DEVICE
FIG. 926



16 INCH GRINDER HEAD ON COLUMN
FIG. 927

These grinders are unusually heavy, and the metal is so disposed as to obtain a maximum strength and reduce the vibration, which is so common in this class of machines, to a minimum. The spindles are of high point carbon steel, turned and ground to size. The ends are provided with 29° threads, of the same depth as, but stronger than, the square threads frequently used. All tight pulleys are shrunk on. The bearings are of cast iron and are unusually large. They are placed as near the wheels as practicable to reduce vibration and are dust proof. The caps of all sizes are tongued and grooved, making them rigid and not liable to work loose. All machines are self-oiling. The self-oiling device which is shown in the cross section of the bearing in the illustration is used on all the grinding machines except the 8-inch size. It insures a plentiful supply of oil and protects the bearings from dust and sediment. The oil is placed in a reservoir underneath the spindle through an oil cap screwed into the side of the bearing. It is fed to the spindle by means of a wiper, which is pressed up by a brass spring and thus kept constantly in contact with the spindle.

The oil tubes on the 8-inch machine are covered by caps instead of the old style plugs. The caps keep all dust or dirt from the tube. In the old method the removal of the plugs for oiling permitted the accumulation of dust to fall into the hole and cut the bearings. In accordance with the modern approved standards, the flanges are heavy and their diameter is one half the diameter of the largest wheel used with the machine. The tight flanges are forced on the spindle, are provided with grooves and run in the counterbores of the boxes to prevent the entrance of dust or dirt to the bearings.

The 8-inch grinding head is regularly furnished plain with rests. All other sizes are furnished with rests only. Sizes from 12 inches up have the valuable feature of interchangeable, engine lathe boxes, which can be replaced in case of wear. The 10-inch and 12-inch heads can be equipped with four wheels or with taper arbors, if desired. Furnished with columns, if specified.

Complete specifications on page 267.

BUILDERS PATENTED COUNTERSHAFTS

COUNTERSHAFTS WITH PATENTED, SELF-CONTAINED BELT SHIFTERS—PULL TO STOP AND PULL TO START
SELF-OILING

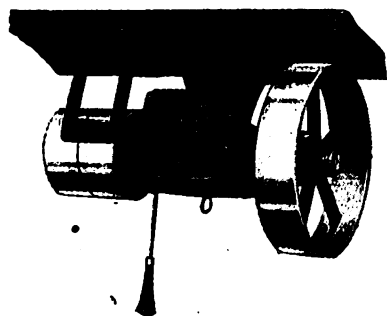


FIG. 928

8, 10 AND 12 INCH SINGLE HANGER PATENTED COUNTERSHAFT

Regularly furnished with Builders machines, but applicable to all types of machines requiring a belt shifting mechanism.

Builders patented countershafts afford a durable, safe and economical device for overhead works. The simplicity of their mechanism relieves the operator of all petty annoyances. The belt may be shifted from the loose to the tight pulley, and vice versa by pulling a small rope. In other words, to start the machine the rope is pulled, and when it is desired to stop the machine, the same rope is pulled in the same manner. The advantage of this method will be appreciated by all, as it offers no chance for the operator to make mistakes at critical moments. There is only ONE thing to do—PULL. There are two styles of countershafts,—single and double hanger. The 8, 10 and 12-inch sizes are of the single hanger type, while the 14, 16 and 18-inch sizes have double hangers.

The material used in the manufacture of countershafts is of best quality and the device is built to withstand the wear and strain of the most severe service. The double hanger countershaft boxes are babitted. All shafts are of mild steel turned true to gauge, and the pulleys and hangers are of high grade gray iron.

Gray iron parts are made in moulding machines. Machining, wherever possible, is automatic and all parts are inspected before they are assembled. All pulleys, after being turned true, are properly balanced.

The loose pulleys and hanger boxes are self-oiling. The oil reservoirs are so constructed that with one filling the countershaft will run for a long time without attention. There is a hole in the end of the hub leading to the reservoir in the loose pulley. When oiling, the reservoir should be filled to within about $\frac{1}{4}$ inch of the edge of the hole. The openings for filling the box reservoirs will be found underneath the boxes.

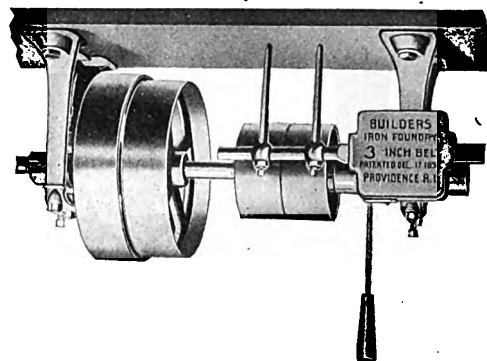


FIG. 929

14, 16 AND 18 INCH DOUBLE HANGER PATENTED COUNTERSHAFT

The countershafts may be placed at practically any height above the machine. They work equally well high or low. Also the rope may be passed around pulleys or led along a large machine so that the shifting of the belt can be controlled from any point.

Builders "Pull to Stop—Pull to Start" countershafts and belt shifters are essentially a safety device and their installation is the best form of machinery accident insurance.

The 14-Inch Patented Countershaft is used with the 14-Inch Grinding Machine and 12-Inch Polishing Machines of all types; also with any machine running 3-inch belts. When furnished with the 14-Inch Grinding Machine, a cone driving pulley is used. When used with the polishing machines, pulleys are furnished as required.

The 16-Inch Patented Countershaft has double hangers, is self-oiling, and the same in design as the illustration on this page. It is used with the 16-Inch Grinding Machine, the Power Lapping Machine, and the 12-Inch Polishing Wheel Stand. When used with the 16-Inch Grinding Machine it is equipped with a cone pulley. It is furnished with a single or cone pulley, with the other two machines, as required.

The 18-Inch Patented Countershaft has double hangers, is self-oiling, and the same in design as the illustration above. It is used with the 18-Inch Grinding Machine, the 14-Inch Ring Oiling Polishing Machine, and the 14-Inch Ball Bearing Polishing Machine. When furnished with the first two machines it is equipped with a cone pulley. When furnished with the last machine it has a single or cone pulley as required.

SPECIFICATIONS OF COUNTERSHAFTS

WITH PATENT BELT SHIFTERS

Size Inches	Tight & Loose Pulleys, Diam. and Face Inches	Driving Pulley Diam. & Face, Inches	Drop of Hanger Inches	Diameter of Shaft Inches	Shipping Weight About lbs.	Style
8	4x1 $\frac{3}{4}$	8x1 $\frac{3}{4}$	5	$\frac{7}{8}$	40	Single Hanger
10	5x2 $\frac{1}{4}$	10x2 $\frac{1}{4}$	6	$\frac{1}{2}$	47	
12	6x2 $\frac{3}{4}$	12x2 $\frac{3}{4}$	7	$\frac{1}{4}$	70	
14	7x3 $\frac{1}{4}$	*13&14x3 $\frac{1}{4}$	8	1 $\frac{1}{8}$	126	Two Hangers
16	8x3 $\frac{3}{4}$	*15&16x3 $\frac{1}{4}$	10	1 $\frac{1}{4}$	134	
18	9x4 $\frac{1}{4}$	*17&18x4 $\frac{1}{4}$	10	1 $\frac{1}{2}$	163	
24	10x5 $\frac{3}{4}$	*17&18x5 $\frac{3}{4}$	12	1 $\frac{1}{2}$	275	Special

*Two pulleys as required by the regular 14, 16 and 18 inch grinder heads. Other sizes of pulleys can be furnished instead of those listed.

BUILDERS GRINDERS

WATER ATTACHMENT

FOR 12 AND 14 INCH GRINDING MACHINES

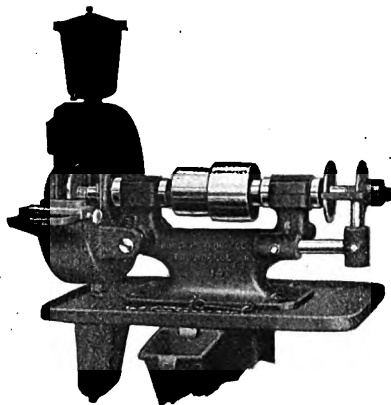


FIG. 930

WATER ATTACHMENT ON 14 INCH GRINDING MACHINE
(FRONT VIEW)

The use of a wet tool grinding machine is advisable at times for sharpening tools, as in grinding tools on a dry wheel there is some danger of drawing the temper. However, in many shops the amount of tool grinding to be done is not sufficient to warrant the purchase of a machine made especially for the purpose. To meet such contingencies a water attachment similar to that shown, is made for use with the 12 and 14-Inch Grinding Machines.

It is attached by means of an arm inserted in the large rest holder socket, and is so constructed that access to the wheel is easily attained by the removal of the outside covering plate. It also has tool rests and plates for deflecting water which are adjustable to the wear of the wheel.

This attachment can be furnished for either the right or left hand side of the machine, but the left hand attachment will be furnished unless otherwise specified.

This attachment adds $14\frac{1}{4}$ inches to the height of a 12-Inch Grinding Machine and $14\frac{3}{8}$ inches to the height of a 14-Inch Grinding Machine.

GUARDS FOR GRINDING WHEELS

Builders Grinding Machines may be equipped with sheet steel and wrought iron guards as shown, adjustable for wear of wheel with removable side for quick change of wheel. These are furnished for grinders 8 to 18 inches inclusive.

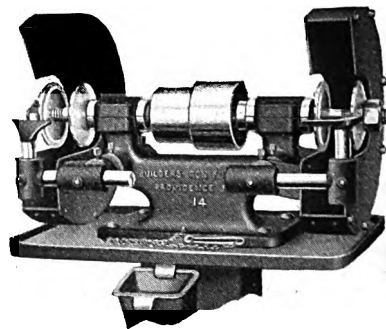


FIG. 931—STEEL GUARDS

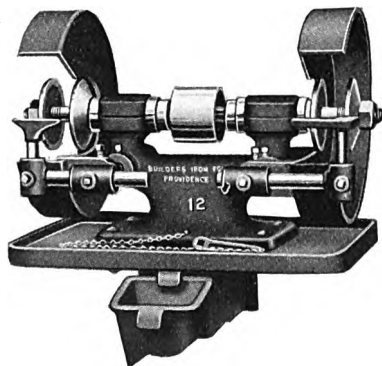


FIG. 932—CAST IRON GUARDS

Builders Grinding Machines may be equipped with open sided cast iron guards as shown in this cut, adjustable for wear of wheel. These are furnished for all grinders 8 to 16 inches inclusive.

EXHAUST CONNECTIONS with $3\frac{1}{2}$ -inch openings may be attached to the 8, 10 and 12-inch Grinders and with 4-inch openings to the 14, 16 and 18-inch Grinders. These are provided for steel guards only.

GLASS GUARDS to protect the operator's eyes from flying particles of emery, may be provided with steel guards.

BUILDERS GRINDERS

8 INCH WITH RESTS FOR GRINDING SMALL TOOLS.

10 INCH FOR TOOL GRINDING, SAW GRINDING AND ALL CLASSES OF MEDIUM GRINDING.

12 INCH FOR TOOL GRINDING AND LARGE VARIETY OF LIGHT WORK.

14 INCH FOR GENERAL SHOP USE, TOOL GRINDING, SNAGGING, ETC.

16 INCH FOR HEAVY SHOP USE OR FOUNDRY WORK.

18 INCH FOR HEAVIEST WORK IN ORDINARY SHOP.

24 INCH HEAVY FLOOR GRINDER, SUITABLE FOR HEAVIEST CLASS OF FOUNDRY AND MACHINE SHOP GRINDING.

SPECIFICATIONS

Size	8"	10"	12"	14"	16"	18"	24"
Size of base.....	7"x6"	9"x6½"	12"x8"	15"x9½"	11"x18"	12½"x21"	40½"x28"
Height from base to center of spindle.....	5¼"	6½"	7¾"	9"	10¼"	11½"	32"
Entire length of plain spindle.....	11"	17"	22½"	29½"	34"	39½"	56"
Entire length of jewelers' spindle.....	13⅞"	.....	.....	.....	.....	.....	.....
Entire length of four wheel spindle.....	.....	20"	26"	.....	.....	.....	.....
Entire length of spindle with taper arbors.....	.....	21¼"	28½"	.....	.....	.....	.....
Taper of arbors per inch.....	.....	.01	.01	.....	.....	.....	.....
Length of each bearing.....	2"	2¾"	3¾"	4¼"	5"	5¾"	10½"
Diameter of spindle in bearings.....	⅝"	⅞"	1⅞"	1⅞"	1⅞"	1⅞"	2⅞"
Diameter of spindle between flanges.....	1½"	¾"	1"	1¼"	1½"	1¾"	2½"
Diameter of flanges.....	3"	5"	6"	7"	8"	9"	12"
Size of pulley on spindle.....	2"x1¾"	2¾"x2¼"	3½"x2¾"	4¼"x5¼"x3¼"	5"x6"x3¾"	5¾"x6¾"x4¼"	8&9"x5¾"
Distance between wheels.....	7"	11"	15"	19"	23"	27"	40"
Height of Column from floor to top of table.....	36¾"	34"	31½"	28½"	25¾"	23"	.....
Base of column.....	13"x16"	14"x18"	16"x21"	18"x24"	20"x27"	22"x30"	.....
Table of column.....	12"x15"	14"x18"	16"x21"	18"x26½"	20"x32"	22"x37½"	.....
Countershaft, R. P. M. about	610	550	495	585	520	440	435
WEIGHTS							
Lead (plain), column, and countershaft, about.....	178 lbs.	.....	.....	.....	.....	.....	.....
Lead (with rests), column and countershaft, about.....	180 lbs.	217 lbs.	320 lbs.	495 lbs.	533 lbs.	753 lbs.	1400 lbs.
Lead (plain) only, about.....	8 lbs.	.....	.....	.....	.....	.....	.....
Lead (with rests) only, about	10 lbs.	25 lbs.	65 lbs.	107 lbs.	175 lbs.	290 lbs.	.....
Column only, about.....	130 lbs.	145 lbs.	185 lbs.	262 lbs.	224 lbs.	300 lbs.	.....
Countershaft only, about....	40 lbs.	47 lbs.	70 lbs.	126 lbs.	134 lbs.	163 lbs.	275 lbs.

PRICES

Size, Inches.....	8	10	12	14	16	18	24
Lead, (with rests) only.....
Lead, (with rests) & Column.....
Lead, (with rests) Column and Countershaft.....
Column, only.....
Countershaft only.....
Water Attachment.....
Surface Grinding Attachment.....
Set Iron Guards, Per Pair....
Steel Guards, Per Pair.....
Shaft Connection.....
Base Guard.....

FOR LARGE PLAIN GRINDERS, INTERNAL GRINDERS, CRANK, CYLINDER, CUTTER AND TOOL, TWIST DRILL, OILSTONE, ETC, PATTERNAKERS' AND DISC PLOW GRINDERS SEE PAGES NOS. 811-813.

STERLING GRINDERS

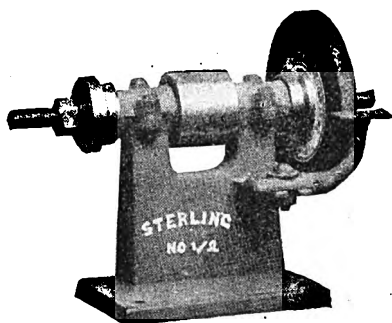


FIG. 933—NO. $\frac{1}{2}$
WILL CARRY TWO 6X1 INCH WHEELS

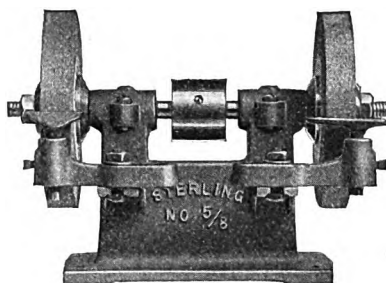


FIG. 935—NO. $\frac{5}{8}$
WILL CARRY TWO 8X1 INCH WHEELS
AND SMALLER

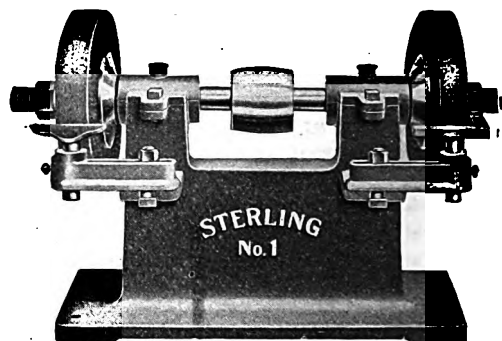


FIG. 937—NO. 1
WILL CARRY TWO 10 X $1\frac{1}{2}$ INCH WHEELS
AND SMALLER

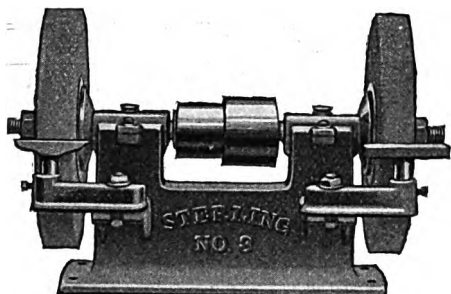


FIG. 4027—NO. 3 WITH CONE PULLEY
WILL CARRY TWO 14 X 2 INCH WHEELS

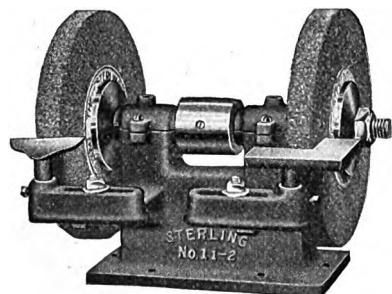


FIG. 934—NO. $1\frac{1}{2}$
WILL CARRY TWO 12 X 2 INCH
WHEELS

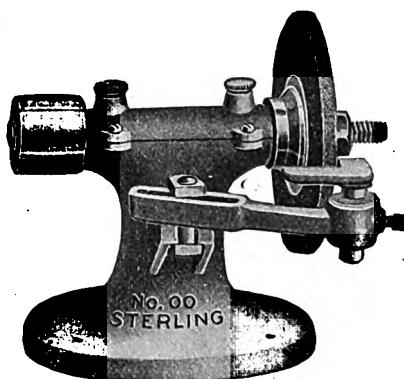


FIG. 4026—NO. 00
WILL CARRY ONE 10 X $1\frac{1}{2}$ INCH WHEEL

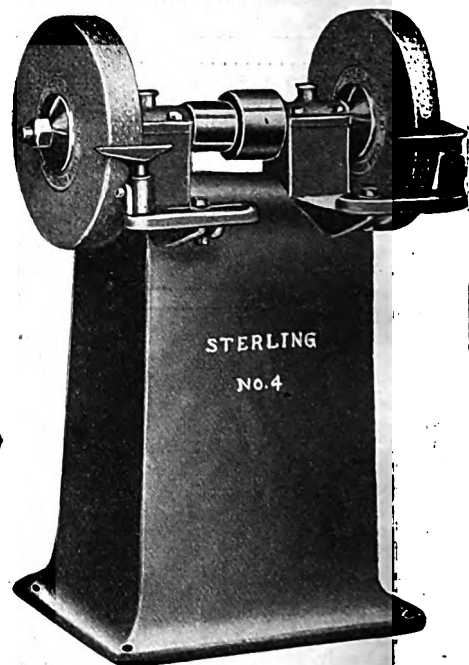


FIG. 936—NO. 4

NO. 4 GRINDER CAN BE ARRANGED TO BELT THROUGH THE FLOOR WHEN DESIRED.
EQUIPPED WITH SELF-OILING BOXES WITH LARGE OIL RESERVOIRS.

Number.....	00	$\frac{1}{2}$	$\frac{5}{8}$	1	$1\frac{1}{2}$	2	3	3 T&L Pulley	3 Cone Pulley	4 Floor
Bench space, inches.....	10x10	10 $\frac{3}{4}$ x4 $\frac{1}{2}$	14x4 $\frac{3}{4}$	18x6	19x6	26x8	26x8	26x8	26x8	35x2 $\frac{1}{2}$
Length of arbor, inches.....	14	10 $\frac{3}{4}$	14	18	19	23 $\frac{1}{4}$	26	26	26	35
Length of bearings, inches.....	2 $\frac{3}{4}$	1 $\frac{7}{8}$	2 $\frac{1}{2}$	3	3 $\frac{5}{16}$	4 $\frac{3}{4}$	4 $\frac{3}{4}$	4 $\frac{3}{4}$	4 $\frac{3}{4}$	7
Dia. of arbor bet. flanges, inches.....	$\frac{3}{4}$	$\frac{1}{2}$	$\frac{5}{8}$	$\frac{3}{4}$	1	1	1	1	1	1 $\frac{1}{2}$
Dia. of flanges, inches.....	3	2	2 $\frac{1}{2}$	3 $\frac{1}{2}$	4 $\frac{1}{2}$	5	5	5	5	5 $\frac{1}{2}$
Distance between wheels, inches.....	7	6 $\frac{1}{4}$	9	12	11 $\frac{1}{2}$	18	18	18	18	24
Height to center of arbor, inches.....	7	5 $\frac{1}{4}$	6	7 $\frac{1}{2}$	8	9 $\frac{1}{4}$	9 $\frac{1}{4}$	9 $\frac{1}{4}$	9 $\frac{1}{4}$	35
Size of wheels, (maximum) inches.....	10x1 $\frac{1}{2}$	6x1	8x1	10x1 $\frac{1}{2}$	12x2	14x2	14x2	14x2	14x2	16x4
Pulley, inches.....	2 $\frac{1}{2}$ x2 $\frac{1}{4}$	2x1 $\frac{5}{8}$	2 $\frac{1}{2}$ x2	2 $\frac{1}{2}$ x2 $\frac{1}{4}$	3x3	3x3 $\frac{1}{2}$	3x3 $\frac{1}{2}$	3x3 $\frac{1}{2}$	4x3x3 $\frac{1}{4}$	3 $\frac{1}{2}$ x5 $\frac{1}{2}$
Weight, lbs.....	25	10	20	35	50	55	85	85	85	530
Countershaft.....	No. 0	No. 0	No. 0	No. 0	No. 1	No. 1	No. 1	.....	No. 1 Spl	No.
Column.....	No. 1	No. 1	No. 1	No. 1	No. 1	No. 3	No. 3	No. 3	No. 3	...
Price, Grinder.....	\$10.00	8.00	12.00	15.00	19.00	23.00	30.00	30.00	36.00	160.00
Price, Countershaft.....	\$15.00	15.00	15.00	15.00	16.00	16.00	16.00	16.00	18.00	28.00
Price, Column.....	.....	\$10.00	10.00	10.00	10.00	15.00	15.00	15.00	15.00	...
Price, Guards.....	.....	\$ 8.00	8.00	12.00	12.00	.....	12.00	12.00	12.00	12.00

FOR COLUMNS AND COUNTERSHAFTS SEE PAGE 269.

FOR WHEEL GUARDS SEE PAGE 269.

FOR LARGE PLAIN GRINDERS, INTERNAL GRINDERS, CRANK, CYLINDER, CUTTER AND TOOL, TWIST DRILL, OIL-
STONE, DISC, PATTERNMAKERS' AND PLOW DISC GRINDERS, SEE PAGES NOS. 811 TO 813.

STERLING GRINDERS

IRON COLUMNS

- No. 1—Used with Grinders Nos. $\frac{5}{8}$, $\frac{1}{2}$, 1 and $1\frac{1}{2}$.
 Height, 28 inches. Size of Table $10 \times 5\frac{1}{2}$ inch.
 Floor space $13\frac{1}{2} \times 15$ inches. Weight, 63 pounds.
- No. 3—Used with Grinders Nos. 2 and 3.
 Height, 32 inches. Size of Table 14×7 inches.
 Floor space $17 \times 15\frac{1}{2}$ inches. Weight, 104 pounds.

GUARDS FOR GRINDING WHEELS

Sterling Grinders may all be equipped with Guards or Protection Hoods over the wheels. This illustration gives you an excellent idea of just what these protectors are like. They are made of steel and securely bolted to the machines. Being adjustable they are so arranged as to follow the wheel when it wears down. Simple in construction; they will be found satisfactory in every respect. See preceding page for prices of each as arranged for various Sterling Grinders. Should only one Guard be required be sure and mention on which side of grinder it will be used.

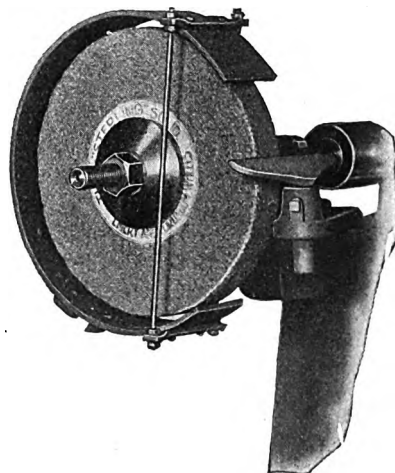
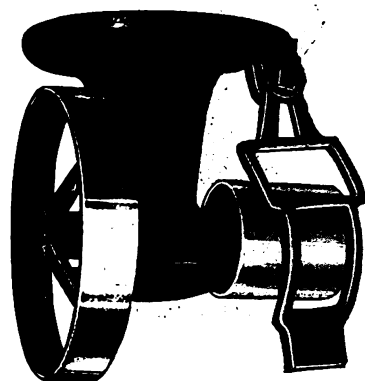
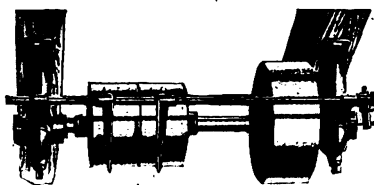


FIG. 943

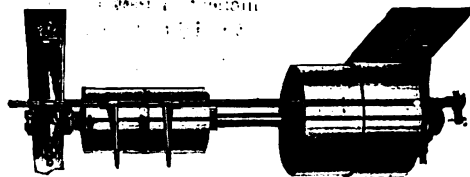
COUNTERSHAFTS



NO. 0—FIG. 940



NOS. 1 TO 3—FIG. 941



NO. 4—FIG. 942

No. 0 For Grinders Nos. 00, $\frac{1}{2}$, $\frac{5}{8}$, and 1. No. 0 has solid base. Can be placed in any position.
 No. 1 For Grinders Nos. $1\frac{1}{2}$, 2 and 3. No. 3 For Grinder No. 3. No. 4 For Grinder No. 4.

COUNTERSHAFT SPECIFICATIONS

Number.....	0	1	1 Sp'l.	2	3	4
Drop of hangers.....inches	$8\frac{3}{8}$	7	7	7	7	7
Length of Spindle....."	$14\frac{1}{2}$	24	27	32	30	30
Tight and Loose Pulleys....."	$5 \times 2\frac{1}{4}$	$6 \times 3\frac{1}{4}$	$6 \times 3\frac{1}{4}$	$8 \times 4\frac{1}{2}$	8×4	$6 \times 3\frac{1}{4}$
Driving Pulleys....."	$12 \times 2\frac{1}{4}$	$10 \times 3\frac{1}{4}$	.....	$12 \times 4\frac{1}{2}$	14×4	.....
Size of cone pulley....."	.....	.....	$10 \times 11 \times 3\frac{1}{4}$	.....	.....	$11 \times 12 \times 3\frac{1}{4}$
Speed, R. P. M., about.....	525	525	525	500	425	450
Weight lbs.....	50	57	57	75	100	110

CANEDY-OTTO GRINDER

NO. 4



FIG. 944

An ideal and very economical Grinder and Polisher for machine shops, foundries, blacksmith shops, garage shops, etc. For large work as well as for small work.

Furnished with rests for heavy work and can readily be adjusted for side or face of wheel.

Carries wheels up to 20x3 inches or smaller with $1\frac{1}{4}$ inch hole. Especially long spindles and bearings.

Bearings have exceptionally large space for the operator and for grinding large irregular shaped castings.

Capacity 20 x 3 inches; wheel with $1\frac{1}{4}$ -inch hole; arbor to floor 30 inches; length of arbor $42\frac{1}{2}$ inches; diameter of arbor $1\frac{1}{4}$ inches; size of pulleys 5 inches by 6 inches. Net weight, 300 pounds. Shipping weight 340 pounds.

List price, Grinder on Column..... \$45.00

No. 4 Countershaft for above; 16-inch drive pulley; 6-inch tight and loose pulleys; net weight, 85 pounds.

List Price, Countershaft..... \$25.00

List Price, Wheel Guards.....each \$10.00

Machines will be furnished with or without rests and countershafts.

Please specify which way to ship.

WITH TIGHT AND LOOSE PULLEYS

Capacity, 20x3 inches; wheel with $1\frac{1}{4}$ -inch hole; arbor to floor 30 inches; length of arbor, $42\frac{1}{2}$ inches; diameter of arbor, $1\frac{1}{4}$ inches; size of pulleys $4\frac{1}{2}$ inches by 4 inches. Net weight 310 pounds. Shipping weight 350 pounds.

Machines will be furnished with or without rests. Specify which way to ship.

No. 4 Grinder with tight and loose pulleys, List Price..... \$50.00



FIG. 945
WHEEL GUARD

PNEUMATIC PORTABLE GRINDERS

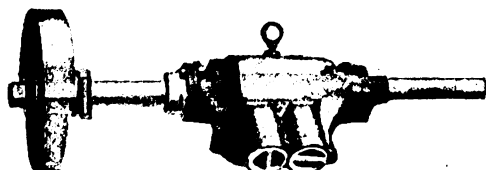


FIG. 946

Made in two sizes, swinging wheels four to eight inches diameter.

For grinding aluminum, brass, bronze, cast iron, wrought iron, chilled iron and steel.

Grinder can be furnished with grip handle.

PRICES UPON APPLICATION

FOR LARGE PLAIN GRINDERS, INTERNAL GRINDERS, CRANK, CYLINDER, CUTTER AND TOOL, TWIST DRILL, OILSTONE, DISC, PATTERNMAKERS' AND PLOW DISC GRINDERS SEE PAGES NOS. 811-813.

U. S. ELECTRICAL GRINDING AND BUFFING OUTFITS

As shop tools these outfits are self-contained, readily installed and may be located or re-located at will in the most advantageous positions with respect to the work to be performed. The absence of belts, shafts and shaft hangers, allowable when direct connected tools are employed, permits the free use of cranes, affords better light and more advantageous location of each working unit. The bearings of direct connected tools, as well, are relieved from any belt pull or slippage, and, in general, greater efficiency and increased shop output results.

SURFACE GRINDER

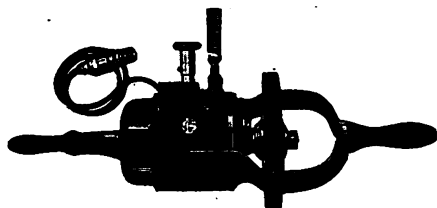


FIG. 947
TYPES RN AND NN

For grinding metal or composition. Eliminates hand filing and chipping. Attach to lamp socket of direct current or single phase alternating current. Motors also wound for 2 or 3 phase A. C. Also made with Universal motor.

THE ORIGINAL CENTER GRINDER

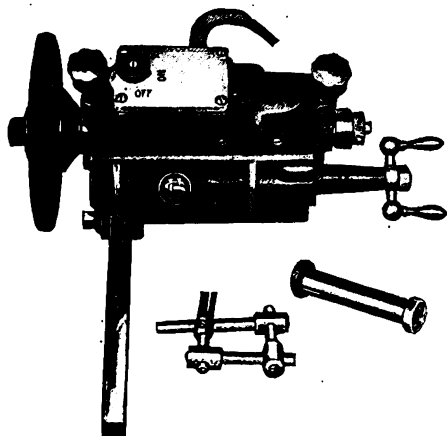


FIG. 948
TYPES H AND JH

Size of wheel, $6 \times \frac{3}{8} \times \frac{1}{2}$ -inch. Travel of grinder, $2\frac{3}{4}$ inches.
Size of wheel, $8 \times \frac{3}{4} \times \frac{5}{8}$ -inch. Travel of grinder, 6 inches.
Sent out complete, as illustrated.



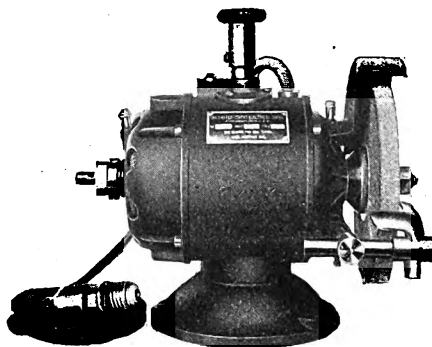
FIG. 954

U. S. BENCH BUFFER

Motors are totally enclosed and equipped with especially heavy shafts and large dust-proof bearings, to insure reliability and minimum wear. Ball bearings used on the standard machines. Ring oiled type bearings can be furnished if desired. Motors require no starting box. Emery Wheels not furnished.

Alternating Current Grinder made for 220-440 volts, 25 or 60 cycle, 2 or 3 phase. Direct current 110, 220, or 550 volts. Variable Speed.

BENCH GRINDERS



TYPES P AND K-FIG. 949

The above cut shows the bench grinder, which is a very handy tool for grinding small tools. It can also be used for polishing and buffing. State when to be used for buffing. The tool rest on grinder is detachable. Bearings adjustable to wear. Air cooled motor. Made for direct current or alternating current.

Ball Bearings furnished when ordered instead of bronze bearings.

ANGLE PLATE GRINDER

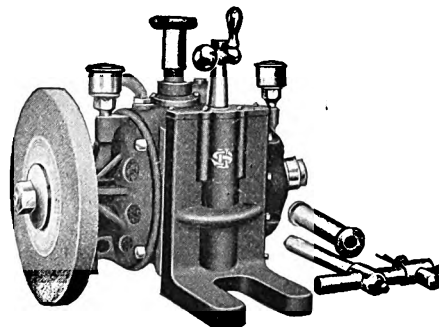


FIG. 950
TYPE J

The cut above shows the $\frac{1}{2}$ -horsepower grinder mounted on an angle plate. It has a vertical adjustment to bring it in line with the centers. For use in lathe, planer or boring mill. Direct or alternating current.

Grinder made with horizontal and vertical feed when ordered.

U. S. ELECTRICAL GRINDING AND BUFFING OUTFITS

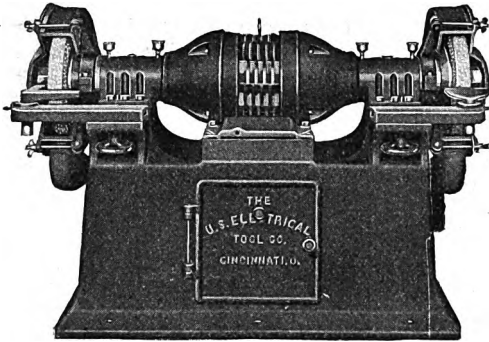
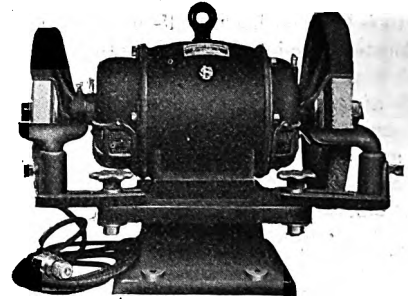


FIG. 951

FLOOR GRINDERS. HEAVY PATTERN TYPE

These grinders are made in two sizes: 5 and 7½ Horsepower. The 5 H. P. takes wheels 18 x 3 or 24 x 4 inches and the 7½ H. P. wheels 24 x 4 inches. Motors wound for direct current 110, 220 or 550 volts. Alternating Current 2 or 3 phase, 110, 220, 440 or 550 volts. Combination Wet and Dry Floor Grinders made in 1-2-3-5 H. P. Sizes.



TYPE KK & KM. FIG. 953

THE U. S. BENCH GRINDER

This cut illustrates the 1 and 2 horsepower bench grinder for tool grinding and general work. Can be used for polishing or buffing. Direct current motors are run from lamp socket. This grinder is also made for alternating current of 110 or 220 volts 2 or 3-phase only. Ball bearings used for bearings.

Pedestal furnished at extra cost.

SPECIFICATIONS AND PRICES

In ordering always mention voltage and state whether current is direct or alternating. If alternating, give voltage, cycles and phase.

TOOL POST GRINDERS

Direct and Alternating Current 110-220 Volts.

Size Wheels Inches	Speed R.P.M.	H. P.	Weight Pounds	Type		Prices	
				Direct Current	Alternating Current	Direct Current	Alternating Current
6x $\frac{3}{8}$ x $\frac{1}{2}$	4500	$\frac{1}{4}$	13	R	RA	.....	.....
6x $\frac{3}{8}$ x $\frac{1}{2}$	4500	$\frac{1}{4}$	21	H	HA	.....	.....
8x $\frac{3}{4}$ x $\frac{7}{8}$	3000	$\frac{1}{2}$	47	JH	JHA	.....	.....
6x $\frac{3}{8}$ x $\frac{1}{2}$	4500	$\frac{1}{4}$	20	HB	HBA	.....	.....

PARALLEL GRINDERS. ANGLE PLATE

Direct and Alternating Current 110-220 Volts.

Sizes Wheel inches	Speed R. P. M.	H. P.	Weight Pounds	Type		Prices	
				Direct Current	Alternating Current	Direct Current	Alternating Current
8x $\frac{1}{4}$ x $\frac{5}{8}$	3000	$\frac{1}{2}$	48	J	JA	.....	.....
10x1x $\frac{1}{2}$	2400	1	87	JK	JKA	.....	.....
12x1 $\frac{1}{4}$ x $\frac{7}{8}$	2050	2	120	M	MA	.....	.....
14x1 $\frac{1}{2}$	1450	3	205	MM	MMA	.....	.....
1x $\frac{1}{4}$	18000-4500	$\frac{1}{4}$	24	HL	HLA	.....	.....
8x $\frac{3}{8}$ x $\frac{5}{8}$	9000-3000	$\frac{1}{2}$	24	JL	JLA	.....	.....
10x1	2400-8500	1	105	JKL	JKLA	.....	.....
12x1 $\frac{1}{4}$	7500	2	245	ML	MLA	.....	.....
5x1	3600	1 Ext.	68	L	LA	.....	.....

BENCH GRINDERS OR BUFFERS

Direct and Alternating Current 110-220 Volts.

Size Wheel Inches	Speed R. P. M.	H. P.	Weight Pounds	Type		Prices	
				Direct Current	Alternating Current	Direct Current	Alternating Current
6x $\frac{3}{8}$	4500	$\frac{1}{4}$	14	P	PA	.....	.....
8x1	3000	$\frac{1}{2}$	57	K	KA	.....	.....
10x1	2400	1	129	KK	KKA	.....	.....
12x1 $\frac{1}{4}$	2050	2	185	KM	KMA	.....	.....
6x $\frac{3}{4}$ x $\frac{5}{8}$	3000	$\frac{1}{2}$	60	KB	KBA	.....	.....
6x1x $\frac{1}{2}$	2400	1	110	KKB	KKBA	.....	.....
8x1 $\frac{1}{4}$ x $\frac{7}{8}$	2050	2	180	KMB	KMBA	.....	.....

KA Grinder can be furnished with two wheels at extra price.
KM Grinder can be furnished for 240 volts at extra price.

U. S. ELECTRICAL GRINDING AND BUFFING OUTFITS

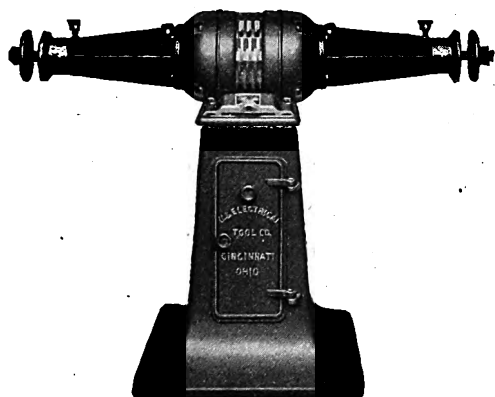


FIG. 952

ELECTRIC BUFFING AND POLISHING MOTOR

These machines are made in two sizes: 3 and 5 H. P. Direct or Alternating Current. Length over all of spindle, 54 inches. Same can be made any length desired. Height, floor to center of spindle 36 inches.

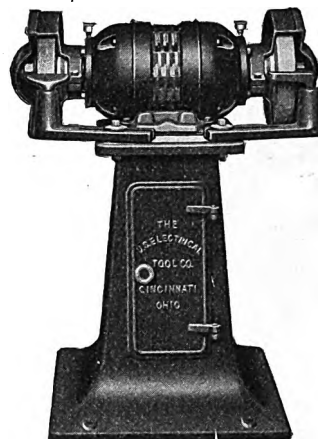


FIG. 955

U. S. BALL BEARING GRINDING MOTOR

Made in two sizes, three and five horsepower. Alternating current or direct current.

SPECIFICATIONS AND PRICES (Continued)

In ordering, always mention voltage and state whether current is direct or alternating. If alternating, give voltage, cycles and phase.

HAND OR AERIAL GRINDERS OR BUFFERS

Direct and Alternating Current 110-220 Volts.

Size Wheel inches	Speed R. P. M.	H. P.	Weight Pounds	Type		Prices	
				Direct Current	Alternating Current	Direct Current	Alternating Current
6x $\frac{3}{8}$ x $\frac{1}{2}$	3800	$\frac{1}{4}$	14 $\frac{1}{2}$	RN	RNA	.....	.....
8x $\frac{3}{4}$ x $\frac{5}{8}$	3000	$\frac{1}{2}$	45	NN	NNA	.....	.....
10x1x $\frac{7}{8}$	2400	1	62	NK	NKA	.....	.....
12x1 $\frac{1}{4}$	2050	2	105	NE	NEA	.....	.....
5x $\frac{3}{4}$	3500	$\frac{1}{4}$	20	OB	OBA	.....	.....
6x1	3500	$\frac{1}{2}$	48	O	OA	.....	.....
8x1	2700	1	65	OO	OOA	.....	.....
8x1 $\frac{1}{2}$	2050	2	132	OM	OMA	.....	.....
8x2	1450	3	170	OMM	OMMA	.....	.....
8x1	2700	1	45	N	NA	.....	.....
5x $\frac{1}{2}$	3000	$\frac{1}{2}$	48	NO	NOA	.....	.....
8x $\frac{3}{8}$	2400	1	70	JO	JOA	.....	.....

FLOOR GRINDERS—WITH OPEN TYPE EMERY WHEEL GUARDS

Size Wheel inches	H. P.	Weight lbs.	Prices	
			Direct Current	Alternating Current
8x1	$\frac{1}{2}$	268	.....	.....
10x1	1	324	.....	.....
12x1 $\frac{1}{2}$	2	410	.....	.....
12x2	3	670	.....	.....
18x3	5	925	.....	.....

Prices on application.

FLOOR GRINDERS. HEAVY PATTERN TYPE

Size Wheel inches	H. P.	R. P. M.	Weight lbs.	Prices	
				Direct Current	Alternating Current
18x3 or 24x4	5	1120	1900	.....	.....
24x4	7 $\frac{1}{2}$	800	2700	.....	.....

Prices on application. Specify what type guards wanted.

BUFFERS ON PEDESTALS

H. P.	Weight lbs.	Prices	
		Direct Current	Alternating Current
$\frac{1}{2}$	278	.....	.....
1	335	.....	.....
2	435	.....	.....
3	685	.....	.....
5	900	.....	.....

Prices on application. Emery Wheel Guards made out of steel or cast iron of the enclosed type with exhaust connection can be furnished on Grinders of 1 H. P. size and larger.

UNIVERSAL TOOL POST GRINDERS

Size Wheels inches	Speed under load	H. P.	Weight lbs.	Type	Price
4 $\frac{1}{2}$ x $\frac{1}{2}$	5000	$\frac{1}{4}$	25	HJU	.....
4 $\frac{1}{2}$ x $\frac{1}{2}$	5000	$\frac{1}{4}$		HU	.....
5 x $\frac{3}{4}$	5000	$\frac{1}{4}$		OBU	.....
5 x1	5000	$\frac{1}{4}$		OU	.....
4 $\frac{1}{2}$ x $\frac{1}{2}$	5000	$\frac{1}{4}$	24	PU	.....

Same Grinder for DC or AC of same voltage 25 to 60 Cycle. Furnished for Single Phase, 110 or 220 volts.

STOW PORTABLE BUFFER AND GRINDER



FIG. 4028

This handy little tool was originally designed for buffing bright surfaces but since its introduction on the market it has been applied for many other purposes, especially for light grinding.

It finds a useful field in buffing signs, brass railings, automobile parts and similar work. As a grinder it is particularly adaptable to roughing small castings.

It can be furnished in three sizes as listed below and is complete with motor, flexible shaft, clamp and spindle attachment plug.

The motor will operate from your lamp socket and can be furnished for 110 or 220 volts, direct current or single phase, 60 cycle, alternating current.

For currents other than these, we can supply special motors.

Number.	1	2	3
Size motor.	$\frac{1}{4}$ h.p.	$\frac{1}{4}$ h.p.	$\frac{1}{4}$ h.p.
Size shaft, number.	1	2	3
Length shaft, feet.	$3\frac{1}{2}$	4	5
Buffing capacity.	2 in.x1 in.	3 in.x1 in.	4 in.x1 in.
Grinding capacity.	$2\frac{1}{2}$ in.x $\frac{1}{2}$ in.	$3\frac{1}{2}$ in.x $\frac{1}{2}$ in.	4 in.x $\frac{3}{4}$ in.
Speed, R. P. M.	3400	3400	3400
Net weight, lbs.	20	22	35
Shipping weight, lbs.	40	45	50

Price upon application.

W & B LATHE ATTACHMENT FOR CYLINDER GRINDING

Converts an ordinary engine lathe into a very efficient cylinder re boring and grinding machine for regrinding automobile, truck, tractor and motor cycle cylinders. The grinder head screws on the spindle of the lathe, the angle plate is bolted on the front end of the carriage with a hole bored in the proper location for the grinder to work through. This cut shows the carriage run full up to the grinder, which would permit grinding to a depth of 14 inches. The wheel or cutter is set off center which compels it to travel in a greater or lesser circle whichever the case requires. The outer end of the lathe spindle is provided with a short hollow shaft on which the driving pulley is carried and through which the drive shaft rotates. Having a universal joint at each end permits working out of line without any cramping or chattering. The screw by which the head is set off center is graduated to read to one one-thousandth of an inch. For instance—if a four or six cylinder block is to be bored and ground, the use of the micrometer screw is of much importance in getting the cylinders all of the same size without continually calipering them. Complete tools as shipped consist of one grinder head with connections through spindle, one counter-shaft, one angle plate, one boring head, six wheels and collets, two wrenches, one spindle for internal work of spindle diameter, and one diamond dresser. Attachment crated for shipment weighs about 215 pounds.

Price upon application.

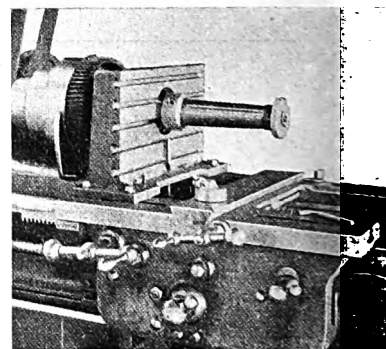


FIG. 4029

W & B LATHE ATTACHMENT FOR UNIVERSAL GRINDING

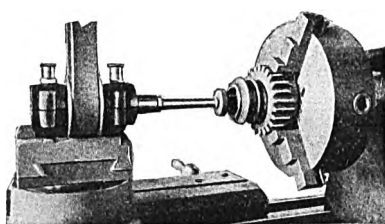


FIG. 4030

The production of mechanical parts that are hardened can only be finished by grinding, if a reasonable degree of accuracy is to be obtained. This tool is designed to be quickly attached to the compound rest of a lathe and is driven by an overhead drum. Thus equipped, a shop not having Universal Grinders, can turn out all of the ordinary repair work rapidly and accurately. Handles all kinds of both cylindrical and internal grinding, such as wrist pins, pistons, knuckle bolts, thrust-bearings, ball-bearing cups, cones, piston rings, hardened transmission shafts, milling cutters, reamers, etc. With internal grinding spindle it will grind holes in gears, ring gauges or other parts which can only be finished by grinding. When mounted on a lathe it has the rigidity of the lathe itself.

Hardened and ground spindle, tool steel taper bearings, $1\frac{1}{8}$ inch diameter; phosphor bronze adjustable bearings; $2\frac{3}{4}$ x $1\frac{1}{8}$ inch flanged pulley which takes $1\frac{1}{4}$ inch belt; interchangeable wheel collets; spindle for internal grinding; countershaft; tight and loose pulleys 2x4 inch, drum 7x36 inches, two wheels.

Price upon application.

BUILDERS POLISHING MACHINES

THREE SIZES. THE LARGEST SIZE USING WHEELS 20 INCHES IN DIAMETER WITH 3 INCH FACE.

SELF OILING. RING OILING. BALL BEARING.

THE METAL OF ALL HEADS IS SO DISTRIBUTED AS TO OBTAIN MAXIMUM STRENGTH AND RIGIDITY.

ALL PARTS ARE INTERCHANGEABLE.

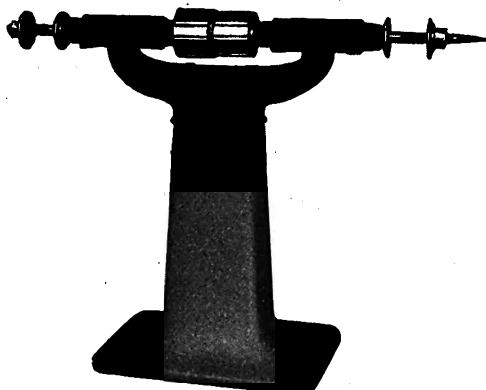


FIG. 957

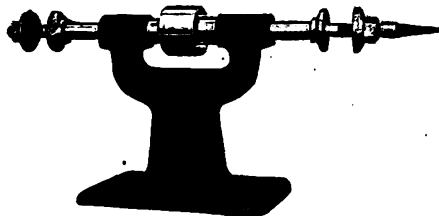


FIG. 956

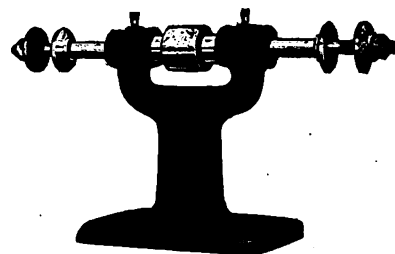


FIG. 958

SELF-OILING TYPE

The polishing machine spindles, like those used on the grinding machines, are of high point carbon steel, turned and ground to size. They also have 29 degree threads. All except those for the 8 Inch Polishing Head are bored and tapped at the right hand end to receive a taper screw which is furnished with each head. Single, tight and loose, or cone pulleys can be furnished as desired. The tight pulleys are shrunk on the spindles.

The flanges are not so large as those used for grinding machine wheels, but are of practically the same design. The tight flanges are forced on the spindles.

The bearings are of cast iron and extra long to insure strength and reduce vibration.

A self-oiling device is provided for all the bearings of the polishing heads except the 8 inch size. It is fully described on page 264 under "Grinding Machines."

The oil tubes which are used on the 8-Inch Polishing Head are provided with caps which protect the bearings from dust.

The columns furnished with polishing machines are specially designed. The bases are unusually large and the metal is so distributed as to make a rigid support.

A table for holding small tools or work is furnished with the column when desired.

STEEL SPINDLES—USED WITH POLISHING HEADS 8 TO 14 INCHES

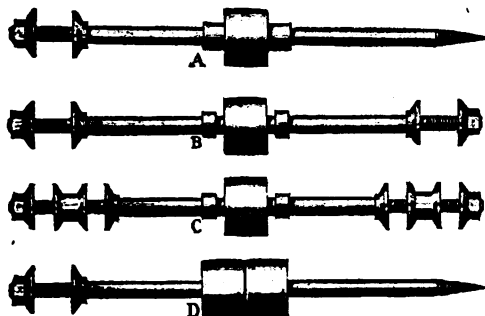


FIG. 959

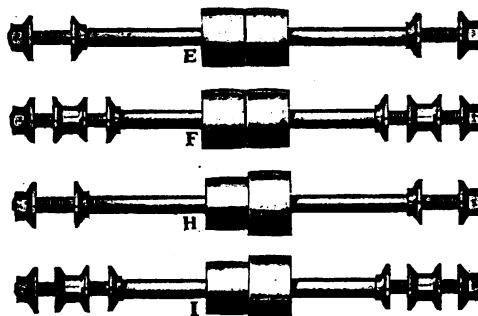


FIG. 960

BUILDERS POLISHING MACHINES

EIGHT INCH-PLAIN

The 8-inch Polishing Head is adapted for all kinds of light polishing or buffing and because of its design is unusually strong and rigid for a machine of such small size. It has cast iron bearings of liberal dimensions and while it is not self-oiling like the larger sized polishing machines, it is conveniently oiled through tubes which are protected from dust by caps.

TEN INCH-SELF-OILING

The 10-inch Polishing Head is designed to do the same class of work as the 8-inch Polishing Head, but because of its greater

DIMENSIONS, INCHES

Size Head.....	8	10	12
Size of Base.....	6½x9	8x12	9½x15
Height from base to center of spindle	8	10	12
Entire length of spindle.....	18	24	36
Length of each bearing.....	2¼	3¼	4¼
Dia. of spindle in bearings.....	¾	1	1¼
Dia. of Spindle between flanges...	½	¾	1
Dia. of Flanges.....	2	2½	3½
Size of single pulley on spindle....	2x1 ⅞	3x2¼	4½x4¼
Size of tight and loose pulleys....	2x1 ⅞	3x2¼	4½x3¼
Size of cone pulley on spindle.....	.....	.....	4½x3¼
Distance between wheels.....	13	17½	26½

SPINDLES

A, B, D or E Spindles can be furnished with the 8-inch Polishing Head.

B, C, E or F Spindles can be furnished with the 10-inch Polishing Head.

B, C, E, F, H or I Spindles can be furnished with the 12-inch Polishing Head.

Unless otherwise ordered, however, heads are shipped with B Spindles.

All spindles except those for the 8-inch Polishing Head are bored and tapped at the right hand end to receive a taper screw which is furnished with each head.

COLUMN

A column can be furnished for the 8, 10 or 12-inch Polishing Head if desired; also a table for holding small tools or work. The table is extra, however, and will not be furnished with the column unless specified.

size and weight has a wider range of usefulness. It is self-oiling and has cast iron bearings sufficiently long to insure a minimum of wear and vibration.

TWELVE INCH-SELF-OILING

The 12-inch Polishing Head is specially designed to meet the demand for a machine which will handle a very wide range of work. The head is of unusually heavy and rigid construction. It has long, cast iron bearings and is self-oiling.

COUNTERSHAFTS

The Single Hanger Countershaft with Patented, Self-Contained Belt Shifter is made for use with the 8 and 10-inch Polishing Heads and the Double Hanger Patented Countershaft is made for use with the 12-inch Polishing Head. These countershafts are illustrated and described on page 265.

PRICES

Size, inches.....	8	10	12
Head only, with A Spindle.....
Head only, with B spindle.....
Head only, with C spindle.....
Head only, with D spindle.....
Head only, with E spindle.....
Head only, with F spindle.....
Head only, with H spindle.....
Head only, with I spindle.....
Head with A spindle, table column and countershaft.....
Head with B spindle, ditto.....
Head with C spindle, ditto.....
Head with D spindle, ditto.....
Head with E spindle, ditto.....
Head with F spindle, ditto.....
Head with H spindle, ditto.....
Head with I spindle, ditto.....
Column only.....
Table only.....
Countershaft only.....
Countershaft only with single pulley.....
Countershaft only with cone pulley.....

G.-P. POLISHING HEADS

NO. 23

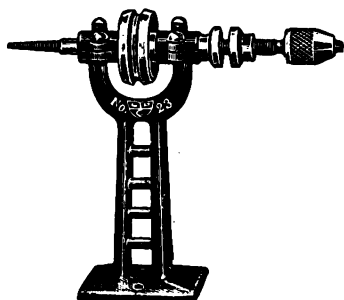


FIG. 961

This little machine has a ¾-inch steel Spindle, 8 inches long. It is provided with a Taper Screw on one end, and a 3-jawed Chuck, capacity 0 to ⅜ inch, on the other. It also has flanges for holding a wheel ¾-inch thick. The Pulley is 1½ inches in diameter and will take ¼-inch round or ¾-inch flat Belt. Iron parts are finished red and black enamel; steel parts, polished. Height, 7 inches. Net weight, 2½ pounds.

Price, each..... \$2.80

NO. 22

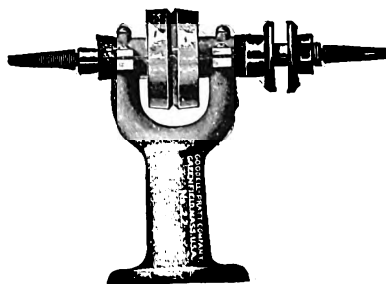


FIG. 962

This Polishing Head is somewhat larger and stronger than the No. 23 Head. It has a ½-inch steel Spindle, 10 inches long, provided with Taper Screws on each end. One end is also provided with flanges for holding a wheel ¾-inch thick. The Pulley is 2¼ inches in diameter. It will take ¼-inch round or ¾-inch flat Belt. Screws and Caps are brass. Iron parts are finished in red and black enamel; steel parts, polished. Height, 7 inches. Net weight, 4 pounds.

Price, each..... \$3.20

SIMPLEX AND DUPLEX EMERY BAND GRINDERS

SIMPLEX EMERY BAND GRINDER

This machine replaces the old expensive hand method of finishing parts that require straight grain finishes. In the old method there often appeared the imperfections of scratches and rounded corners but with the use of this machine every article has a straight grain finish and sharp edges.

Size Grinding Table, inches.....	10 $\frac{1}{4}$ x5
Size Abrasive Band, inches.....	4 wide x 36 $\frac{1}{4}$ long
Size Driving Pulley, inches.....	5x2 face
Speed, R. P. M.....	500 to 1100

Price upon application.

These machines also come in larger sizes.

Advise us your requirements and we will gladly submit this information.

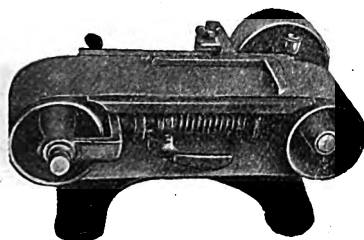


FIG. 5156

DUPLEX-B EMERY BAND AND DISC GRINDER

This machine is equipped with tight and loose pulleys, bronze bushings so enclosed as to prevent the admission of dust, or dirt, bevel attachment which can be regulated to any required angle, and is mounted on a substantial, jar-protecting table.

Size of Grinding Table.....	10 in.x18 in.
Size of Abrasive Band.....	8 in. wide x 61 in. long
Size of Tight and Loose Pulleys.....	6 in. x 2 $\frac{1}{2}$ in. face
Speed.....	1100 R.P.M.
Price.....	on application.

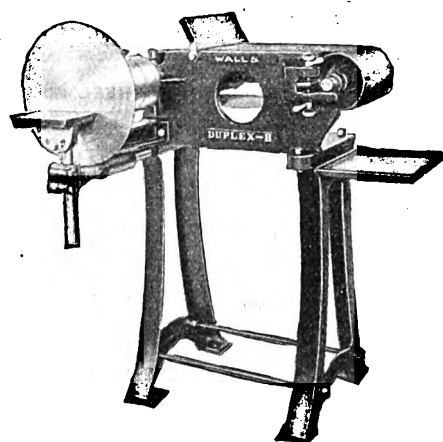


FIG. 964

SIMPLEX EMERY BAND GRINDER NO. 4

This machine has many exclusive features. The adjustable work table instead of being fastened to the platen is operated on two shafts which are part of the frame and are entirely independent of the table. The table is adjustable to any angle. The upper adjustable table is so arranged that the throat through which the belt passes can be adjusted, allowing only the thickness of the belt to pass through, overcoming the danger of injury to the operator. The sliding adjustable boxes work on a swivel, giving the shaft perfect freedom in any position. The tension screws pass through brass nuts, making a thoroughly mechanical proposition. A cast iron dust collector, ready to connect with exhaust system forms part of the machine.

Drums.....	15x15 in.
Speed, T. and L. Pulleys.....	10x4 $\frac{1}{2}$ ins. 800 R.P.M.
Belt Speed.....	3000 ft. per min.
Shaft 45 Carbon Steel.....	1 $\frac{1}{2}$ in.
Belt Table.....	36x16 in.
Work Table.....	30x10 in.
Length of Belt.....	11 ft. 1 in.
Width of Belt.....	14 in.
Price.....	on application.

SIMPLEX EMERY BAND GRINDER NO. 5

Same as No. 4—has 20 in. width belt.

SIMPLEX EMERY BAND GRINDER NO. 6

Same as No. 4—has 9 in. width belt.

FURTHER PARTICULARS UPON REQUEST

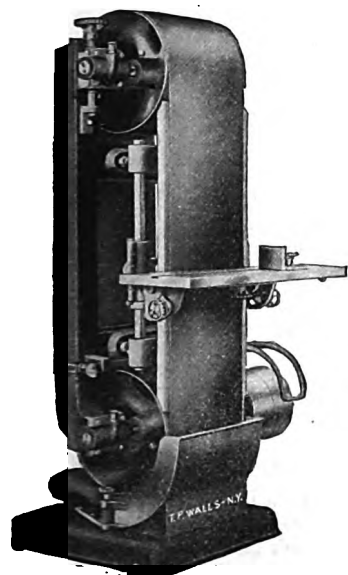


FIG. 965

CARBORUNDUM AND ALOXITE GRINDING WHEELS

CHARACTERISTICS OF GRINDING WHEELS



FIG. 981

Grinding wheels possess two distinct characteristics which are known as fineness and hardness. Either or both of these may be varied with the object of suiting the wheel to efficiently perform a desired grinding operation. It is, of course, necessary that a grinding wheel should be composed of an abrasive material which is in itself suited to the peculiarities of the work to be done, but in addition to this it is also necessary that the size of the grains used, or the fineness of the wheel, and the degree of bonding, or hardness of the wheels, should be suited to a particular operation.

The degree of fineness is termed the "grit" of an abrasive wheel and is controlled by the size of the abrasive grain used and indicated by a number. The finish required in any grinding operation is often a controlling factor in the selection of the grit for a grinding wheel. In cases where the finish is not important, the amount of material which may be economically removed in a given time by an abrasive wheel must be considered when selecting the grit.

The term hardness when applied to an abrasive wheel indicates the degree of bonding, or the resistance which the wheel offers to the forces which tend to break it down or cause it to crumble away when in operation. This hardness is called the "grade" of the wheel and is indicated by a letter chosen arbitrarily and which refers to certain standards set by the Company.

The different gradings are produced by a variation of the amount and character of the bonding materials used to hold the grains together.

The selection of the correct grade is determined by the character of the material to be ground, the speed of the wheel, the application of the work to the wheel, and numerous other more or less important factors which must all be carefully considered. The existing conditions in each application of a grinding wheel must receive careful consideration when selecting both the grit and the grade. A wheel which is too hard will heat the work and glaze and will not cut freely; if too soft it will cut rapidly, but at the same time the wheel will wear down so quickly that the result is not economical.

SHAPES OF WHEEL EDGES

In ordering wheel state the shape of face desired.

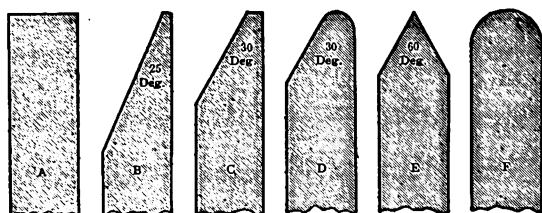


FIG. 986

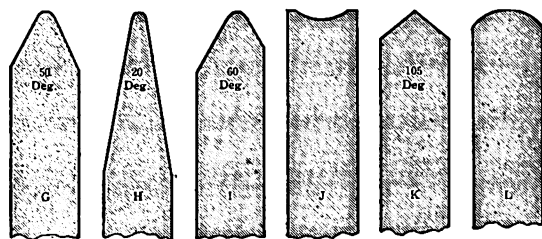


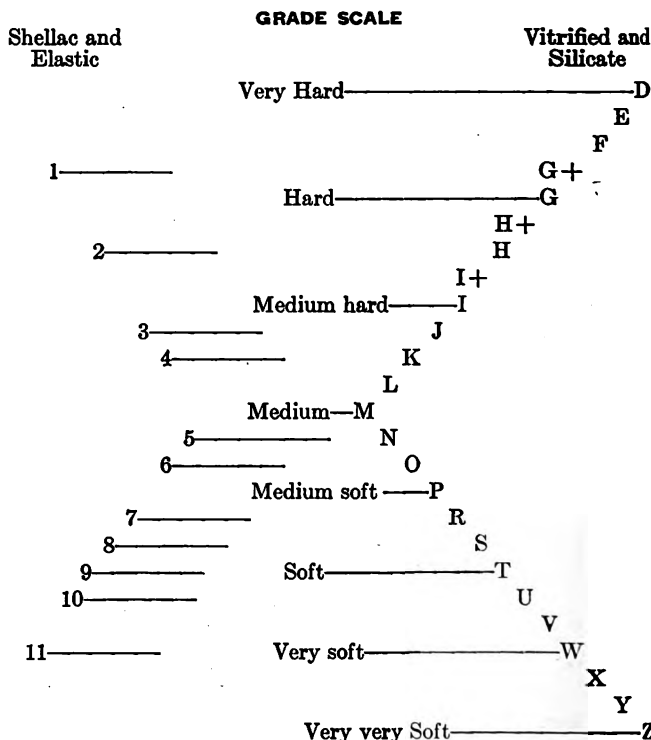
FIG. 987

The above diagram illustrates standard forms of wheel edges. The beveled, rounded, and concaved shapes are made by turning up the plain "A" shape with a dresser. There is practically no limit to the number of forms that may be produced. The Carborundum Company supplies wheels with any of the standard forms of wheel edges without extra charge.

On page 302 are listed and illustrated various types of wheel dressers suited to the general requirements of wheel dressing. The use of diamond points is recommended only for the production of sharp profiles for the dressing of fine wheels and for the dressing of wheels in special cases where great accuracy is necessary.

To successfully meet all conditions to which they are subjected, Carborundum and Aloxite wheels are made in twenty-five (25) degrees; of hardness.

These, in the case of vitrified wheels, are represented by letters in a scale from "D," which is very hard, to "Z," which is very, very soft, and in the case of shellac and elastic wheels, by numerals from 1, which is hard, to 11, which is very soft, as shown in the table or scale following:



In addition to the characteristic of hardness, as represented by the grade letter, the requirements of special grinding conditions are fulfilled by providing in each grade a variety of wheel textures. This is done by the use of different bond mixtures or different types of bonds.

THE TESTING OF GRINDING WHEELS

The system of testing grinding wheels in The Carborundum Company's plants is so thorough and so carefully conducted as to preclude the possibility of a defective wheel being shipped. The importance of this insurance of safety is well realized when

it is considered that grinding wheels are subjected to so many and varied conditions and that the possibilities for accident are, therefore, numerous.

In order to determine that Carborundum and Aloxit wheels are sufficiently strong to withstand the work for which they are intended, they are given what is designated as a speed test. Each wheel eight inches and over in diameter is run at not less than 40 per cent above authorized normal operating speed, thereby subjecting it to fully twice the stress of normal working conditions.

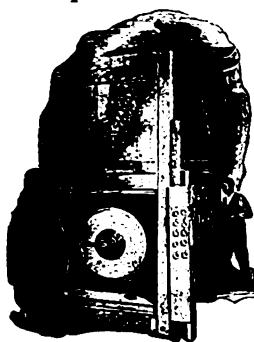
The testing work is assigned to careful responsible men, who at the close of each day go before a notary

public and subscribe and swear to the tests they have recorded. The number and conditions of each test are made a matter of record.

These tests and inspections insure each wheel being in perfect condition before it leaves the factory, but unintelligent handling after it is received by the customer or rough usage in transit may injure it in such a way as to make it unsafe to run. For instance, in mounting a wheel it should slide easily on the arbor or mandrel. It should never be forced, but should fit just closely enough so as not to wobble. A wheel forced on a shaft or arbor may burst as the direct result of the expansion of the lead bushing produced by the heating of the shaft from a warm bearing.

Before mounting a wheel should be lightly tapped. If it does not ring with a clear tone it is probably cracked and should not be used.

A grinding wheel should not be used without flanges. The flanges, whether straight or tapered, should be frequently inspected to prevent the using of those that might be bent or sprung out of true. Wheel washers of some compressible material, such as blotting paper, rubber or leather, slightly larger than the diameter of the flanges, should be fitted between the wheel and the flanges.



SPEEDING TEST OF WHEELS

FIG. 983

MINIMUM SIZES OF MACHINE SPINDLES IN INCHES FOR VARIOUS DIAMETERS AND THICKNESSES OF GRINDING WHEELS

Diam. in Ins.	Thickness of Wheel in Inches									
	1/4	3/8	1/2	5/8	3/4	1	1 1/4	1 1/2	1 3/4	2
6	1/2	1/2	1/2	1/2	1/2	1/2	5/8	5/8	3/4	3/4
7	1/2	1/2	1/2	1/2	1/2	1/2	5/8	5/8	3/4	3/4
8	5/8	5/8	5/8	5/8	5/8	5/8	3/4	3/4	1	1
9	5/8	5/8	5/8	5/8	5/8	5/8	3/4	3/4	1	1
10	3/4	3/4	3/4	3/4	3/4	3/4	1	1	1	1
12	3/4	3/4	3/4	3/4	3/4	1	1 1/4	1 1/4	1 1/4	1 1/4
14	7/8	7/8	7/8	7/8	1	1	1 1/4	1 1/4	1 1/4	1 1/4
16	..	..	..	..	1 1/4	1 1/4	1 1/4	1 1/4	1 1/4	1 1/4
18	..	..	..	..	1 1/4	1 1/4	1 1/4	1 1/4	1 1/4	1 1/4
20	..	..	..	..	..	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2
24	..	..	..	..	..	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2
26	..	..	..	..	..	..	1 1/2	1 1/2	1 3/4	1 3/4
30	..	..	..	..	..	..	..	1 3/4	1 3/4	2
36	..	..	..	..	..	..	..	2	2 1/4	2 1/4

Diam. in Ins.	Thickness of Wheel in Inches									
	2 1/4	2 1/2	2 3/4	3	3 1/4	3 1/2	4	4 1/2	5	
6	3/4	3/4	3/4	3/4	3/4	3/4	1	1	1	1
7	3/4	3/4	3/4	3/4	3/4	3/4	1	1	1	1
8	1	1	1	1	1	1	1 1/4	1 1/4	1 1/4	1 1/4
9	1	1	1	1	1 1/4	1 1/4	1 1/4	1 1/4	1 1/4	1 1/4
10	1	1 1/4	1 1/4	1 1/4	1 1/4	1 1/4	1 1/4	1 1/2	1 1/2	1 1/2
12	1	1 1/4	1 1/4	1 1/4	1 1/4	1 1/4	1 1/2	1 1/2	1 1/2	1 1/2
14	1 1/4	1 1/4	1 1/4	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2
16	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 3/4	1 3/4	1 3/4	1 3/4
18	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 3/4	1 3/4	1 3/4	1 3/4
20	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 3/4	1 3/4	1 3/4	1 3/4
24	1 3/4	1 3/4	1 3/4	1 3/4	1 3/4	1 3/4	2	2	2	2
26	1 3/4	1 3/4	2	2	2	2	2 1/4	2 1/4	2 1/4	2 1/4
30	2	2	2	2	2 1/4	2 1/4	2 1/2	2 1/2	2 1/2	2 1/2
36	2 1/4	2 1/4	2 1/2	2 1/2	2 1/2	2 3/4	2 3/4	3	3	3

REVOLUTIONS PER MINUTE FOR VARIOUS SIZES OF GRINDING WHEELS TO GIVE PERIPHERAL SPEED IN FEET PER MINUTE AS INDICATED BY THE FOLLOWING TABLE

Diam. of Wheel in Inches	4,000	4,500	5,000	5,500	6,000
1	15,279	17,200	19,099	21,000	22,918
2	7,639	8,590	9,549	10,500	11,459
3	5,093	5,725	6,366	7,000	7,639
4	3,820	4,295	4,775	5,250	5,730
5	3,056	3,440	3,820	4,200	4,584
6	2,546	2,865	3,183	3,500	3,820
7	2,183	2,455	2,728	3,000	3,274
8	1,910	2,150	2,387	2,626	2,865
10	1,528	1,720	1,910	2,100	2,292
12	1,273	1,433	1,592	1,750	1,910
14	1,091	1,228	1,364	1,500	1,637
16	955	1,075	1,194	1,314	1,432
18	849	957	1,061	1,167	1,273
20	764	860	955	1,050	1,146
22	694	782	868	952	1,042
24	637	716	796	876	955
26	586	661	733	809	879
28	546	614	683	749	819
30	509	573	637	700	764
32	477	537	596	657	716
34	449	506	561	618	674
36	424	477	531	584	637
38	402	453	503	553	603
40	382	430	478	525	573
42	364	409	455	500	546
44	347	391	434	477	521
46	332	374	415	456	498
48	318	358	397	438	477
50	306	344	383	420	459
52	294	331	369	404	441
54	283	318	354	389	425
56	273	307	341	375	410
58	264	296	330	363	396
60	255	287	319	350	383

CORRECT OPERATING SPEEDS FOR GRINDING WHEELS

The grits and grades of Carborundum and Aloxit wheels other than those made by the elastic and rubber processes are established in accordance with certain standards and for ordinary grinding purposes it is recommended that these wheels be operated at a speed of from 5,000 to 6,000 surface feet per minute.

CARBORUNDUM AND ALOXITE GRINDING WHEELS



FIG. 982

CARBORUNDUM

The abrasive for grinding brass, bronze, aluminum, cast iron, marble and glass, pearl, etc. Carborundum Wheels cut fast and clean—do not glaze—hold their shape—show economy in their long life.

Carborundum is a manufactured abrasive. It is not found in nature. It is not even an imitation of nature, but is an absolutely unique and distinct creation.

Carborundum is a chemical combination of the two elements, carbon and silicon. It is the trade name given to carbide of silicon—a substance not discovered but actually created by Edward G. Acheson in 1891.

It is very much harder than any other known abrasive, which gives it great durability. It is made up of small, sharp crystals that are just brittle enough to break slightly in use. The sharp edges of the crystals cut clean and fast; while the brittleness, by constantly presenting fresh cutting edges, prevents glazing. The combination of these qualities—durability, rapidity and uniform efficiency—gives to carborundum its unquestioned title of being the best of all known abrasives.

ALOXITE

In its crude form Aloxite is taken from the electric furnace in the form of an immense compact pig weighing several tons. This pig, by means of special, powerful machinery, is crushed or reduced to grain form. The Aloxite grain then undergoes a thorough refining until every possible atom of impure matter is removed. The grains are then dried out, graded by sifting through a series of screens, and are then ready to be made into grinding wheels, etc.

Aloxite, because of its positive purity, its hardness, sharpness, toughness and proper temper, has been extensively successful in all classes of steel grinding. It not only cuts fast, cool and clean, but it shows wonderful durability, standing up to the work with remarkable tenacity. It is in these features that Aloxite is proving far superior to any other steel cutting abrasives.

GRITS AND GRADES OF WHEELS FOR VARIOUS CLASSES OF GRINDING

In submitting the following table of grits and grades of wheels for different kinds of grinding it must be distinctly understood that the information is general. Conditions under which wheels are used vary so greatly that we do not wish our friends and prospective customers to accept the grading as our best recommendation for their work. If a customer orders a wheel from this table and finds that it is not accomplishing the work as he desires, we request that he write to us stating in what manner the wheel fails.

WORK	CARBORUNDUM		ALOXITE		WORK	CARBORUNDUM		ALOXITE	
	Grit	Grade	Grit	Grade		Grit	Grade	Grit	Grade
Aluminum castings.....	16 to 24	H to I.			Marble moulding, rough....	4 to 6	S.....		
Brass castings, large.....	16 to 24	A1 to 2 Elas			Marble moulding, finish....	40	M.....		
Brass castings, small.....	24 to 36	G + to H.			Nickel castings.....	20 to 24	G + to G.		
Bronze castings.....	20 to 30	H to I.			Pearl grinding, rough.....	30 to 50	G to I.		
Brick, fire.....	14 to 16	H to I.			Pearl grinding, finish.....	100 to 150	E to H.		
Brick, pressed.....	14 to 16	I to K.			Porcelain, roughing.....	40 to 50	G to H.		
Car wheels.....	14 to 24	G + to I +.	20 to 24	G to I.	Porcelain, finishing.....	100 to 150	F to H.		
Dies, steel.....			36 to 60	J to M.	Plows, chilled iron surfacing	16 to 20	G + to H.		
Dies, chilled iron.....	20 to 24	H + to I +.			Plows, chilled iron points..	20 to 24	G + to H.		
Drop forgings.....			20 to 30	H + to F.	Plows, steel jointing.....			14 to 16	G to H
Files.....			30 to 60	H to F.	Plows, steel surfacing.....			161 to 20	F to G +
Glass, roughing.....	60 to 120	K to M.	80 to 120	K to M.	Pulleys, cast iron surfacing.	30 to 40	L to M.		
Glass, finishing.....			180 to FF	J to L.	Razors, grind and conceaving			70 to 100	P to R
Cast iron, roughing.....	14 to 24	G + to H +			Reamers, taps, auto.....			40 to 60	M to P
Cast iron, finishing.....	60 to 80	G to H.			Reamers, taps, hand.....			50 to 60	K to M
Cast iron, surfacing.....	24 to 36	M to P.			Rolls, iron cast, wet.....	24 to 40	M to P.		
Cast iron, cylindrical.....	246 to 403	N to P.			Rolls, chilled iron roughing	30 to 40	2 to 3.		
Cast iron, internal.....	40 to 60	O to P.			Rolls, chilled iron finishing.	60 to 80	4 to 7.	70 to 80	5 to 7
Cast iron, Gas Engine, cyl.	303 to 365	P to S.			Rubber, hard.....	36 to 50	K to M.		
Cast iron, plows.....	16 to 20	G + to H +.			Rubber, soft.....	20 to 36	J to K.		
Cast iron, sh. on shears.....	80 to 100	E to G.			Sad irons, roughing.....	20 to 36	G + to H.		
Chilled iron.....	16 to 24	G + to H.			Sad irons, finishing.....	100 to 150	G to H.		
Wrought iron.....	20 to 24	H + to I.	20 to 30	G to H.	Saws, gumming, heavy.....			365	K to J and 246, 4 to 5
Knives, leather shaving.....	502 to 702	I + to J.	50 to 70	I + to J.	Saws, gumming, light.....			365 to 403	K to L
Knives, leather splitting.....			24 to 30	7 to 9 Elas.	Saws, sharpening.....			365 to 403	K to M
				K to M	Saws, cold.....			50 to 80	G to I
Knives, moulding bits.....			40 to 60	3 to 5 Elas.	Shovels, edging.....			20 to 30	E to F
Knives, planer hand.....			365 to 60	K to M	Steel, large castings.....			10 to 16	F to H
Knives, planer auto.....			303	P to M	Steel, small castings.....			16 to 24	G to H
Knives, paper auto.....			303 to 365	P to R	Steel, hardened surfacing..			36 to 50	P to T
Knives, shear & shear bl....			16 to 24	J to M	Steel, internal.....			50 to 70	J to N
Knives, shoe.....			60 to 70	J	Steel, soft cylindrical.....			246 to 365	J to M
Lathe centers.....	60 to 100	K to L.	80 to 120	K to M	Steel, soft surfacing.....			20 to 36	P to T
Lathe and planer tools.....	24 to 36	H to I.	20 to 36	H to J	Steel, hardened cylindrical.			246 to 365	M to N
General machine shop use..	20 to 24	H + to I.	20 to 30	G to H	Steel, manganese.....			14 to 24	F to H
					Steel, structural.....			14 to 20	G to H
Malleable iron castings, lge.			10 to 16	F to H	Stove castings.....	20 to 30	F to G +		
Malleable iron castings, sm.			16 to 24	G to H	Small tools.....			40 to 60	J to K
Milling cutters, auto.....			40 to 60	M to O	Twist drills, hand.....			40 to 60	I to J
Milling cutters, hand.....			40 to 60	J to M	Twist drills, auto.....			40 to 50	M to O
Marble, rough surfacing.....	40 to 80	L to M.			Wood working tools.....			365 to 60	K to M
Marble, finish surfacing.....	180 to FF	2 to 3.							
Marble, coping.....	16 to 24								

CARBORUNDUM AND ALOXITE GRINDING WHEELS

REGULAR GRINDING WHEELS

Grinding wheels are placed in four classes according to the process of manufacture, as follows, vitrified, silicate, rubber and elastic, these designations having reference to the character of the bonding agent used and the method of fusing the mixture to abrasive grain and the bond.

In the manufacture of vitrified wheels certain clays and spar are used as the bonding agent. The majority of grinding wheels are made by this process because it is possible to secure a wide range of work and therefore vitrified wheels can be used in a greater variety of work. Silicate wheels are bonded with silicate of soda. These wheels, while fast cutting, do their work less harshly than the vitrified wheels. They are limited to few grades and are used principally in knife grinding, some saw gumming work, and for grinding special tools. The rubber wheels are bonded with rubber. They are extremely hard and fast cutting and principally used for sawing purposes, cutting off materials of high tensile strength, etc. In the elastic wheels shellac is the bonding agent used. The elastic wheels are used for sawing or slotting marble and for saw gumming.

Both the rubber and elastic wheels can be made extremely thin, yet they can be run at a high rate of speed with safety and can be used in work where it is necessary for the wheel to withstand heavy side strains.

FOR TABLE SHOWING SPEED OF GRINDING WHEELS, SEE PAGE 282

IN ORDERING WHEELS STATE THE SHAPE OF FACE DESIRED. SEE PAGE 278

PRICE LIST—STRAIGHT, VITRIFIED, SILICATE AND ELASTIC BOND WHEELS

Diameter		Thickness of Wheels in Inches and Millimeters																		Diameter	
In.	mm.	In. 1/8	1/2	3/4	1	1 1/4	1 1/2	1 3/4	2	2 1/4	2 1/2	2 3/4	3	3 1/4	3 1/2	3 3/4	4	mm.	In.		
1	25	\$0.40	\$0.50	\$0.60	\$0.70	\$0.80	\$0.95	\$1.05	\$1.15	\$1.25	\$1.35	\$1.45	\$1.55	\$1.70	\$1.80	\$1.90	\$2.00	25	1		
2	50	.60	.75	.90	1.00	1.15	1.30	1.45	1.60	1.75	1.85	2.00	2.15	2.30	2.40	2.55	2.70	50	2		
3	75	.80	1.00	1.20	1.45	1.65	1.85	2.10	2.30	2.50	2.70	2.95	3.15	3.35	3.55	3.80	4.00	75	3		
4	100	1.10	1.40	1.65	1.95	2.25	2.55	2.80	3.10	3.40	3.70	4.00	4.25	4.55	4.80	5.10	5.40	100	4		
5	125	1.50	1.90	2.25	2.65	3.00	3.40	3.80	4.15	4.55	4.90	5.30	5.70	6.05	6.40	6.80	7.20	125	5		
6	150	1.90	2.40	2.90	3.40	3.90	4.45	4.95	5.40	5.95	6.50	7.00	7.50	8.00	8.50	9.00	9.50	150	6		
7	175	2.30	2.95	3.60	4.30	4.95	5.60	6.30	6.90	7.55	8.20	8.90	9.60	10.25	10.90	11.55	12.20	175	7		
8	220	2.70	3.55	4.40	5.20	6.10	6.90	7.80	8.60	9.45	10.30	11.15	12.00	12.85	13.70	14.55	15.40	220	8		
9	230	3.10	4.15	5.20	6.30	7.40	8.40	9.50	10.60	11.65	12.70	13.75	14.80	15.90	17.00	18.05	19.10	230	9		
10	250	3.60	4.90	6.20	7.50	8.90	10.20	11.50	12.80	14.10	15.40	16.70	18.00	19.35	20.70	22.00	23.30	250	10		
12	305	4.20	6.00	7.80	9.50	11.30	13.10	14.90	16.70	18.45	20.20	22.00	23.80	25.55	27.30	29.10	30.90	305	12		
14	355	4.90	7.20	9.60	11.90	14.20	16.50	18.90	21.20	23.50	25.80	28.15	30.50	32.80	35.10	37.45	39.80	355	14		
16	405	5.70	8.70	11.60	14.60	17.60	20.50	23.50	26.50	29.45	32.40	35.35	38.30	41.30	44.30	47.25	50.20	405	16		
18	460	6.60	10.30	14.00	17.70	21.40	25.10	28.80	32.50	36.15	39.80	43.50	47.20	50.90	54.60	58.30	62.00	460	18		
20	510	.....	12.30	16.80	21.40	25.90	30.50	35.00	39.60	44.15	48.70	53.35	58.00	62.50	67.00	71.50	76.00	510	20	
22	560	.....	.....	20.10	25.60	31.10	36.70	42.20	47.70	53.35	59.00	64.60	70.00	75.50	81.00	86.50	92.00	560	22
24	610	.....	.....	24.00	30.60	37.30	44.00	51.00	59.00	65.00	71.00	78.00	85.00	92.00	99.00	106.00	113.00	610	24
26	660	.....	.....	36.40	44.50	52.50	61.00	69.00	77.00	85.00	93.00	101.00	109.00	117.00	125.00	133.00	141.00	660	26
28	710	.....	.....	.....	48.00	55.00	65.00	74.00	83.00	92.00	102.00	111.00	120.00	129.00	139.00	148.00	157.00	710	28
30	760	.....	.....	.....	58.00	68.00	79.00	89.00	100.00	111.00	122.00	132.00	143.00	153.00	164.00	174.00	184.00	760	30
32	810	.....	.....	.....	.....	72.00	84.00	96.00	109.00	121.00	133.00	145.00	157.00	169.00	181.00	193.00	205.00	810	32
34	865	.....	.....	.....	.....	82.00	95.00	109.00	123.00	136.00	150.00	163.00	177.00	191.00	204.00	218.00	231.00	865	34
36	915	.....	.....	.....	.....	94.00	109.00	124.00	139.00	154.00	169.00	183.00	198.00	213.00	228.00	243.00	257.00	915	36
38	965	.....	.....	.....	.....	.....	109.00	136.00	153.00	170.00	187.00	204.00	221.00	238.00	255.00	272.00	289.00	965	38
40	1015	.....	.....	.....	.....	.....	.....	151.00	170.00	189.00	207.00	226.00	245.00	264.00	283.00	302.00	321.00	1015	40
42	1070	.....	.....	.....	.....	.....	.....	.....	.....	209.00	229.00	249.00	270.00	290.00	311.00	331.00	351.00	1070	42
44	1120	.....	.....	.....	.....	.....	.....	.....	.....	228.00	251.00	274.00	297.00	319.00	342.00	365.00	388.00	1120	44
46	1170	.....	.....	.....	.....	.....	.....	.....	.....	249.00	274.00	299.00	324.00	349.00	374.00	399.00	424.00	1170	46
48	1220	.....	.....	.....	.....	.....	.....	.....	.....	.....	271.00	299.00	326.00	353.00	380.00	407.00	434.00	1220	48
50	1270	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	353.00	383.00	412.00	442.00	471.00	1270	50
52	1320	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	382.00	414.00	446.00	478.00	510.00	1320	52
54	1370	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	412.00	447.00	481.00	515.00	550.00	1370	54
56	1425	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	443.00	480.00	517.00	554.00	591.00	1425	56
58	1475	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	476.00	515.00	555.00	594.00	634.00	1475	58
60	1525	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	509.00	551.00	594.00	636.00	679.00	1525	60

RUBBER BOND WHEELS TAKE DIFFERENT LIST—SEE PAGE 282



FIG. 1019

RUBBER GRINDING WHEELS

CARBORUNDUM AND ALOXITE



FIG. 1020

For special grinding operations where the grinding wheel is subjected to great lateral stress while in operation, or where very thin wheels are used, it is necessary to employ rubber as a binding material, as it would be unsafe under such conditions to operate wheels made with a vitrified bond. For thin wheels, which are required to hold a thin, sharp profile on the cutting edge, a rubber bond is also employed.

The range of grades which can be obtained by the use of the rubber process is not nearly so wide as with the vitrified process, so that rubber wheels are not found to be efficient—apart from the consideration of the safety factor—for as many classes of grinding as are the vitrified wheels. For the grinding of some classes of malleable iron castings, however, rubber wheels are used with economical and efficient results.

Carborundum and Aloxite rubber wheels are bonded with the finest grade of para rubber. In their manufacture the grains of Carborundum or Aloxite are first mixed with the rubber and vulcanizing agents. This mass is moulded into the shape required and then vulcanized by special processes by means of which the maximum strength and elasticity, together with the desired grade of hardness, are obtained. Large rubber wheels are generally mounted on iron centers, the wheels being moulded directly about the center in the forming operation. With Carborundum and Aloxite rubber wheels remarkable results have been obtained on all classes of work for which these wheels are adapted, both in regard to fast cutting qualities and durability.

In general practice rubber wheels are operated at approximately 8,000 surface feet per minute, although for certain operations a higher speed is desirable.

METHOD OF CALCULATING LIST PRICE OF RUBBER WHEELS

Diameter—Wheels with diameters less than one inch take the list of a one inch wheel.

Wheels with diameters represented by fractional parts of inches, intermediate to diameters shown on list, take the list of the next larger diameter.

Thickness—Wheels thinner than one-quarter of an inch take the list of a wheel one-quarter inch thick.

Wheels with thicknesses intermediate to those shown in list take the list of the next thicker wheel.

Wheels thicker than four inches are figured proportionately to the four inch thickness; thickness to increase from four inches by quarter inches and intermediate fractional parts of inches to be figured at next higher quarter of an inch.

Hole—An allowance is made of one-half the list price of a wheel represented by the diameter of the hole six inches and larger. For holes less than six inches in diameter, or for counter-sinks of any size, no allowance is made.

If the diameter of a hole is represented by odd inches, or fractional parts of inches not shown in list, the next smaller diameter is taken as representing the diameter of a wheel for which allowance is made, the thickness of such a wheel to be the same as the wheel from list of which the deduction is made.

In the case of a rubber wheel mounted on an iron center an allowance is made in the list price of the wheel for a hole the size of the iron center, lugs and dovetails not included. If a new center is supplied it is charged for at a price shown in the following list:

The price of rubber cup wheels is figured in the same manner as vitrified cup wheels from the list on page 284.

The price of rubber cylinder wheels is figured in the same manner as vitrified cylinder wheels from the list on page 283.

LIST FOR IRON CENTERS

Dia. in. ins.	Thickness in Inches									
	1	1¼	1½	1¾	2	2½	2¾	3	3½	4
8	\$1.10	\$1.25	\$1.45	\$1.65	\$1.85	\$2.30	\$2.50	\$2.75	\$3.25	\$3.75
10	1.40	1.60	1.80	2.00	2.25	2.70	3.00	3.25	3.75	4.25
12	1.70	1.90	2.10	2.35	2.60	3.10	3.50	3.75	4.25	4.75
15	.....	.....	4.50	4.75	5.00	5.50	5.75	6.00	6.50	7.00

PRICE LIST—RUBBER WHEELS

In..... mm.....		¼ 6	⅜ 10	½ 12	⅝ 16	¾ 19	⅞ 23	1 25	1¼ 32	1½ 38	1¾ 45	2 50	2¼ 56	2½ 63	2¾ 70	3 75	3¼ 82	3½ 88	3¾ 95	4 100	.....in. .....mm.		Rev. per min. to give surface speed of 8,000 ft. per min.
in.	mm.																				In.	mm.	
1	25	\$0.40	\$0.45	\$0.50	\$0.55	\$0.60	\$0.65	\$0.70	\$0.80	\$0.95	\$1.05	\$1.15	\$1.25	\$1.35	\$1.45	\$1.55	\$1.70	\$1.80	\$1.90	\$2.00	1	25	30,558
1½	38	.50	.60	.65	.75	.80	.85	.90	1.00	1.15	1.30	1.40	1.50	1.60	1.75	1.85	2.00	2.10	2.25	2.35	1½	38	20,372
2	50	.60	.70	.75	.85	.90	.95	1.00	1.15	1.30	1.45	1.60	1.75	1.85	2.00	2.15	2.30	2.40	2.55	2.70	2	50	15,278
2½	63	.70	.80	.90	1.00	1.10	1.20	1.30	1.50	1.70	1.90	2.10	2.15	2.30	2.50	2.65	2.85	3.00	3.20	3.35	2½	63	12,222
3	75	.80	.90	1.00	1.10	1.20	1.35	1.45	1.65	1.85	2.10	2.30	2.50	2.70	2.95	3.15	3.35	3.55	3.80	4.00	3	75	10,186
3½	88	.95	1.05	1.15	1.30	1.40	1.55	1.70	1.95	2.20	2.45	2.70	2.95	3.20	3.50	3.70	3.95	4.20	4.45	4.70	3½	88	8,732
4	100	1.10	1.25	1.40	1.55	1.65	1.80	1.95	2.25	2.55	2.80	3.10	3.40	3.70	4.00	4.25	4.55	4.80	5.10	5.40	4	100	7,640
4½	115	1.30	1.45	1.60	1.80	1.95	2.25	2.30	2.60	2.90	3.25	3.60	4.00	4.30	4.65	5.00	5.30	5.60	5.95	6.30	4½	115	6,790
5	125	1.50	1.70	1.90	2.10	2.25	2.45	2.65	3.00	3.40	3.80	4.15	4.55	4.90	5.30	5.70	6.05	6.40	6.80	7.20	5	125	6,112
6	150	1.90	2.15	2.40	2.65	2.90	3.15	3.40	3.90	4.45	4.95	5.40	5.95	6.50	7.00	7.50	8.00	8.50	9.00	9.50	6	150	5,092
7	175	2.30	2.65	2.95	3.30	3.60	3.95	4.30	4.95	5.60	6.30	6.90	7.55	8.20	8.90	9.60	10.25	10.90	11.55	12.20	7	175	4,364
8	200	2.70	3.10	3.55	4.00	4.40	4.80	5.20	6.10	6.90	7.80	8.60	9.45	10.30	11.15	12.00	12.85	13.70	14.55	15.40	8	200	3,820
9	230	3.10	3.65	4.15	4.70	5.20	5.80	6.30	7.40	8.40	9.50	10.60	11.65	12.70	13.75	14.80	15.90	17.00	18.05	19.10	9	230	3,396
10	250	3.60	4.25	4.90	5.60	6.20	6.90	7.50	8.90	10.20	11.50	12.80	14.10	15.40	16.70	18.00	19.35	20.70	22.00	23.30	10	250	3,056
12	305	4.20	5.10	6.00	6.90	7.80	8.70	9.50	11.30	13.10	14.90	16.70	18.45	20.20	22.00	23.80	25.55	27.30	29.10	30.90	12	305	2,548
14	355	4.90	6.10	7.20	8.40	9.00	10.80	11.90	14.20	16.50	18.90	21.20	23.50	25.80	28.15	30.50	32.80	35.10	37.45	39.80	14	355	2,182
16	405	5.70	7.20	8.70	10.20	11.60	13.10	14.60	17.60	20.10	23.50	26.50	29.45	32.40	35.35	38.30	41.20	44.10	47.00	50.20	16	405	1,910
18	460	6.00	8.40	10.30	12.15	14.00	15.85	17.70	21.40	25.10	28.80	32.50	36.15	39.80	43.50	47.20	50.90	54.60	58.30	62.00	18	460	1,698
20	510	7.80	10.00	12.30	14.55	16.80	19.10	21.40	25.90	30.50	35.00	39.60	44.15	48.70	53.35	58.00	62.50	67.00	71.50	76.00	20	510	1,528
22	560	9.10	11.85	14.60	17.35	20.10	22.85	25.60	31.10	36.70	42.20	47.70	53.35	59.00	64.50	70.00	75.50	81.00	86.50	92.00	22	560	1,388
24	610	10.80	14.10	17.40	20.70	24.00	27.30	30.60	37.30	44.00	51.00	59.00	66.00	73.00	80.00	87.00	94.00	101.00	108.00	113.00	24	610	1,274

CARBORUNDUM AND ALOXITE CYLINDER WHEELS

RULES FOR CALCULATING LIST PRICES

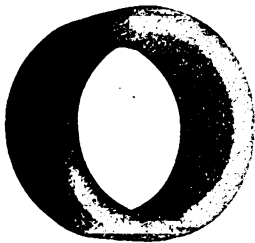


FIG. 992

A wheel 8" or more outside diameter, 4" or more height with a hole not less than 6" in diameter, rim thickness not exceeding 4" and without inside projections, is figured as a cylinder.

A wheel of this type with inside projections is a cup wheel.

A cylinder with outside projections or with tapered rims takes the list price of the maximum diameter and maximum thickness of rim.

Example: A taper cylinder 12"-10" diameter, 6" in height, with a rim taper 1" at top to 1½" at bottom, takes a list of 12x6x1½ wheel, \$32.10.

Example: A cylinder 16" in diameter at top, 5" high, with a rim 2" thick at the top, and with an outside projection at the bottom of one-half an inch, lists as an 18x5x2½" rim, or \$59.70.

Cylinder wheels with diameters intermediate to those shown on list take the list of the next larger diameter.

Cylinders with heights intermediate to those shown in list take the list of the next higher cylinder.

Cylinder wheels with rim thicknesses intermediate to those shown in list take the list of the next thicker rim.

Cylinders more than 8" in height are figured proportionately to the 8" height for any listed diameter. Heights of cylinders increase by 1" from 8", and intermediate heights take the price of the next higher inch.

Example: A cylinder 26" in diameter, 8" in height, with 2" rim, lists as \$166.95.

A cylinder of the same diameter with rim height 9" would take an additional list of one-eighth of \$166.95 or \$20.85, making total list for cylinder 26x9x2" rim, \$187.80.

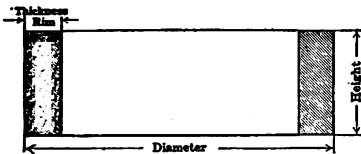


FIG. 993

CYLINDERS—PRICE LIST—EFFECTIVE JULY 1, 1915

Diam. in Ins.	Height in Ins.	Thickness of Rim in Inches							Diam. in Ins.	Height in Ins.	Thickness of Rim in Inches						
		1	1½	2	2½	3	3½	4			1	1½	2	2½	3	3½	4
8	4	\$13.75	.....	.....	.....	.....	.....	.....	20	4	\$51.15	\$53.85	\$56.10	\$58.80	\$61.20	\$63.15	\$65.20
	5	17.35	.....	.....	.....	.....	.....	.....		5	61.20	64.60	67.50	70.75	73.75	76.05	78.60
	6	19.75	.....	.....	.....	.....	.....	.....		6	70.60	74.55	78.10	81.90	85.45	88.30	91.30
	7	22.30	.....	.....	.....	.....	.....	.....		7	80.95	85.50	89.65	94.00	98.10	101.40	104.85
	8	25.50	.....	.....	.....	.....	.....	.....		8	92.50	97.70	102.45	107.40	112.10	115.90	119.80
9	4	16.30	\$17.20	.....	.....	.....	.....	.....	22	4	62.80	65.80	68.70	71.50	74.05	76.45	78.70
	5	19.80	20.95	.....	.....	.....	.....	.....		5	75.60	79.35	82.90	86.35	89.50	92.50	95.25
	6	22.45	23.85	.....	.....	.....	.....	.....		6	87.15	91.60	95.85	100.00	103.75	107.25	110.55
	7	25.60	27.15	.....	.....	.....	.....	.....		7	100.05	105.25	110.10	114.90	119.25	123.40	127.20
	8	29.25	31.00	.....	.....	.....	.....	.....		8	114.35	120.30	125.80	131.30	136.30	141.00	145.40
10	4	18.90	20.05	\$21.10	.....	.....	.....	.....	24	4	70.30	73.65	76.90	79.95	82.90	85.60	88.20
	5	22.50	23.95	25.20	.....	.....	.....	.....		5	86.55	90.70	94.75	98.40	102.10	105.45	108.60
	6	25.60	27.30	28.50	.....	.....	.....	.....		6	100.45	105.40	110.20	114.60	118.95	122.95	126.75
	7	29.35	31.20	33.00	.....	.....	.....	.....		7	115.05	120.75	126.45	131.50	136.50	141.15	145.50
	8	33.55	35.65	37.70	.....	.....	.....	.....		8	131.50	138.00	144.50	150.30	156.00	161.30	166.30
12	4	22.20	23.70	25.00	\$26.20	\$27.10	.....	.....	26	4	81.40	85.20	88.65	92.05	95.25	98.25	101.20
	5	26.20	28.00	29.65	31.05	32.20	.....	.....		5	99.90	104.50	108.85	113.05	116.95	120.70	124.30
	6	30.00	32.10	34.05	35.80	37.15	.....	.....		6	116.35	121.80	127.00	132.00	136.95	141.15	145.35
	7	34.35	36.85	38.85	41.05	42.70	.....	.....		7	133.75	140.10	146.10	151.95	157.35	162.55	167.40
	8	39.25	42.10	44.40	46.90	48.80	.....	.....		8	152.85	160.10	166.95	173.65	179.80	185.75	191.30
14	4	27.30	29.05	30.70	32.20	33.45	\$34.60	\$35.55	28	4	90.70	94.75	98.55	102.40	105.85	109.35	112.75
	5	32.85	35.05	37.05	38.85	40.50	41.85	43.05		5	111.85	116.95	121.60	126.30	130.65	135.10	139.15
	6	37.75	40.35	42.75	44.85	46.90	48.45	49.90		6	129.85	136.00	141.55	147.10	152.35	157.60	162.45
	7	43.80	46.80	49.65	52.15	54.30	56.25	58.00		7	150.55	157.75	164.20	170.55	176.70	182.85	188.40
	8	50.05	53.50	56.75	59.60	62.05	64.30	66.30		8	172.05	180.30	187.65	194.90	201.95	208.95	215.30
16	4	34.20	36.30	38.25	40.05	41.25	43.15	44.40	30	4	104.20	108.45	112.65	116.80	120.60	124.05	127.90
	5	41.10	43.80	46.20	48.45	49.95	52.20	53.85		5	128.50	133.80	139.05	144.00	148.65	153.10	157.75
	6	48.55	51.60	54.45	57.15	58.90	61.65	63.60		6	148.90	155.20	161.50	167.35	172.90	178.15	183.75
	7	55.35	58.90	62.20	65.40	67.35	70.60	72.85		7	172.00	179.25	186.60	193.30	199.75	205.90	212.35
	8	63.25	67.30	71.10	74.75	76.95	80.70	83.25		8	196.55	204.85	213.25	220.90	228.30	235.30	242.70
18	4	42.70	45.00	47.25	49.35	51.30	52.80	54.70			.....	.....	.....	.....	.....	.....	.....
	5	51.40	54.30	57.10	59.70	62.10	64.00	66.25			.....	.....	.....	.....	.....	.....	.....
	6	59.10	62.35	65.95	69.00	71.85	74.20	76.90			.....	.....	.....	.....	.....	.....	.....
	7	67.75	71.85	75.70	79.30	82.50	85.35	88.35			.....	.....	.....	.....	.....	.....	.....
	8	77.40	82.10	86.50	90.60	94.30	97.55	100.95			.....	.....	.....	.....	.....	.....	.....

CARBORUNDUM AND ALOXITE CUP WHEELS

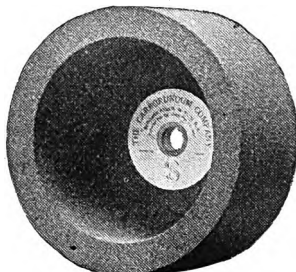


FIG. 988

PRICE LIST CUP WHEELS—EFFECTIVE JULY 1, 1915

Diam in Ins.	Height in Ins.	Thickness of Rim and Back in Inches							Diam in Ins.	Height in Ins.	Thickness of Rim and Back in Inches						
		1	1½	2	2½	3	3½	4			1	1½	2	2½	3	3½	4
8	4	\$16.20							18	7	\$77.70	\$83.20	\$87.90	\$91.95	\$95.20	\$97.80	100.30
	5	18.90								8	88.80	95.10	100.45	105.10	108.80	111.75	114.60
	6	21.45								Back per inch	4.75	4.20	3.65	3.15	2.70	2.25	1.85
	7	23.85								20	4	61.60	66.40	69.75	73.30	76.05	77.95
	8	27.25								5	71.65	77.05	81.10	85.15	88.55	90.75	92.85
9	4	18.25	\$19.20						22	6	81.70	87.70	92.35	97.00	100.90	103.65	106.20
	5	21.55	22.75							7	92.25	98.95	104.20	109.35	113.85	117.10	120.10
	6	24.15	25.60							8	105.40	113.10	119.10	124.95	130.10	133.85	137.25
	7	27.15	28.80							Back per inch	6.05	5.40	4.75	4.20	3.65	3.15	2.70
	8	31.00	32.90							4	74.25	79.65	84.40	88.45	91.65	94.30	96.30
10	4	21.00	22.20	\$23.20					24	5	86.80	92.95	98.25	103.00	106.80	110.05	112.60
	5	24.70	26.20	27.40						6	98.85	105.75	111.85	117.25	121.65	125.40	128.50
	6	27.75	29.55	30.70						7	112.35	119.95	126.60	132.70	137.70	142.05	145.65
	7	31.45	33.45	35.20						8	128.40	137.10	144.70	151.65	157.35	162.35	166.45
	8	35.95	38.25	40.25						Back per inch	7.45	6.75	6.05	5.40	4.75	4.20	3.65
12	4	25.50	27.30	28.65	\$29.70	\$30.25			26	4	84.10	90.55	96.15	100.95	105.00	108.30	111.00
	5	29.50	31.60	33.30	34.60	35.35				5	99.40	106.65	113.10	118.50	123.30	127.30	130.50
	6	33.45	35.85	37.90	39.45	40.45				6	113.65	121.65	128.85	135.00	140.50	145.05	148.95
	7	38.05	40.80	42.90	44.95	46.20				7	128.85	137.65	145.75	152.50	158.65	163.90	168.30
	8	43.50	46.65	49.00	51.35	52.80				8	147.25	157.30	166.55	174.30	181.30	187.30	192.35
14	4	31.80	34.20	36.10	37.50	38.55	\$39.25	\$39.60	28	Back per inch	9.05	8.25	7.45	6.75	6.05	5.40	4.75
	5	37.45	40.20	42.45	44.20	45.60	46.50	47.10		4	95.40	103.00	109.60	115.30	120.10	124.15	127.50
	6	42.60	45.90	48.55	50.55	52.35	53.50	54.30		5	112.30	120.70	128.10	134.65	140.10	144.90	158.95
	7	49.00	52.60	55.65	58.05	60.00	61.50	62.65		6	128.55	137.85	146.10	153.45	159.75	165.25	169.90
	8	56.00	60.10	63.60	66.35	68.55	70.30	71.60		7	145.95	156.15	165.25	173.40	180.40	186.60	191.95
16	4	39.75	42.85	45.30	47.25	48.30	49.80	50.50	30	8	166.80	178.45	188.85	198.15	206.15	213.25	219.35
	5	47.55	51.25	54.15	56.55	57.90	59.80	60.85		Back per inch	10.75	9.85	9.05	8.25	7.45	6.75	6.05
	6	55.00	59.05	62.40	65.25	66.85	69.25	70.60		4	110.70	120.00	128.20	134.85	141.00	146.40	150.70
	7	62.35	66.85	70.60	74.05	75.85	78.70	80.35		5	131.20	141.55	150.55	158.10	165.15	171.45	176.40
	8	71.25	76.40	80.75	84.60	86.70	89.95	91.80		6	149.10	160.50	170.40	178.80	186.75	193.90	199.75
18	4	51.40	55.15	58.30	60.85	62.80	64.05	65.40	Back per inch	7	169.50	181.95	192.75	202.00	210.85	218.85	225.30
	5	60.25	64.60	68.25	71.35	73.75	75.40	77.10		8	193.35	206.50	218.50	229.65	239.55	247.65	256.05
	6	68.85	73.50	78.00	81.55	84.40	86.50	88.65		Back per inch	12.45	11.80	10.95	9.90	9.15	8.35	7.50
										4	126.00	136.15	145.00	153.60	160.90	166.30	172.05
										5	150.15	161.35	171.25	180.70	188.80	195.15	201.75

For Rules for Calculating Prices on Cup Wheels See Page 285.

CARBORUNDUM AND ALOXITE CUP WHEELS

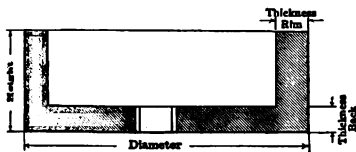


FIG. 989

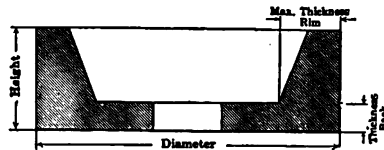


FIG. 990

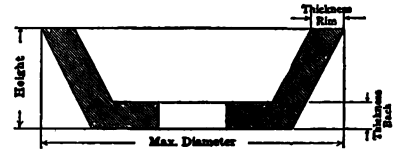


FIG. 991

RULES FOR CALCULATING LIST PRICES BACKS

The cup wheel price list is based on cups with the same back and rim thickness.

A wheel 8" or more outside diameter, 4" or more in height, with an inside cup diameter of not less than 6", and a rim thickness not exceeding 4" is figured as a cup wheel. Cups with outside projections, or tapered rims, take the list of the maximum diameter and maximum thickness of rim.

Example: A cup 24" diameter at top, 7" high, with a rim 3" thick at the top and having an outside projection of 3-8" at the bottom, lists as a 26x7x3½" cup wheel at \$186.60.

Example: A taper cup 14—12½" diameter, 7" in height, with rim tapering, 1½" at top to 2½" at bottom, takes list of a cup 14"x7"x2½" rim and back, \$58.05.

Cup wheels with diameters intermediate to those shown in list take the list of the next larger diameter.

Cup wheels with heights intermediate to those shown in list take the list of the next higher cup.

Example: Cup 6¼" high lists as 7".

Cup wheels with rim thicknesses intermediate to those shown in list take the list of the next thicker rim.

Example: 1¼" rim takes list of 1½" rim.

Cup wheels more than 8" in height are figured proportionately to the 8" height for any listed diameter.

Heights of cups increase by 1" from 8", and intermediate heights take the list of the next higher inch.

Example: A cup 28" diameter, 8" high, with 3" rim, lists at \$240.95. A cup of same diameter and rim thickness, but 9" high, would take an additional list of ¼ of \$240.95 or \$30.10, making a total list for the cup 28" diameter, 9" high, 3" rim of \$271.05.

A price per inch or fractional part of an inch is shown in list opposite "Back per Inch," for figuring the list price of a cup wheel with back and rim of different thickness.

Cup wheels with backs varying in thickness from that of their rims to the extent of fractional parts of inches take the list of the next higher inch in thickness.

Example: The list of an 8" cup wheel, 4" high, with 1" rim and 1" back, is \$16.20. Price per inch for backs of greater or less thickness is \$0.65. If a 1½" or 2" back is desired, add \$0.65 to the list price for a wheel with 1", making list of \$16.85.

Example: The list of a 16" cup wheel, 7" high, with 2½" rim and 2½" back is \$74.05. Price per inch for backs of greater or less thickness is \$2.25. If a 1" or 1½" back is desired, deduct \$2.25 from the list price for wheels with 2½" back, making list \$71.80.

For cup wheels more than 8" in height, with thickness of the back varying from that of rim, calculate first the list for height and then make proper additions or deductions for back.

Example: A cup 14" diameter, 9" high, 2" rim, 3" back. The list price of the cup 8" high and 2" back is \$63.60. Add ¼ or \$7.95, which amounts to \$71.55, plus \$1.85 for the extra thickness of back, which makes the price \$73.40.

If the back were 1" thick, \$1.85 would be deducted from \$71.55.

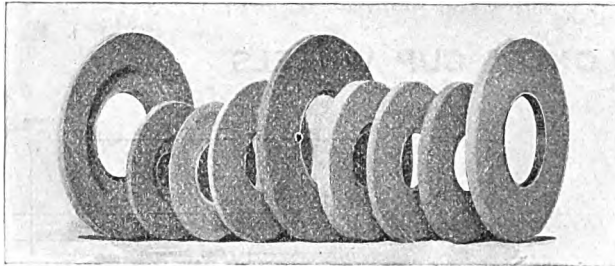
If the back were between 1" and 2" thickness, no allowance would be made.

The back of a cup wheel is represented by any projection inside the cup, whether it is in the form of a small shoulder, raised dove-tail, or complete back.

For backs less than 1" deductions from list down to 1" only are allowed, and made only in full inches.

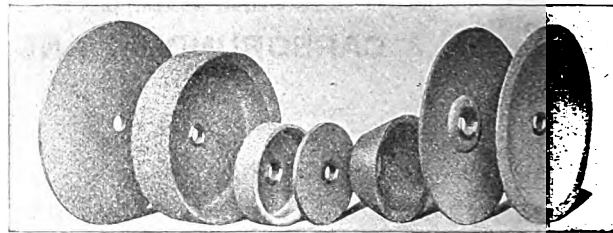
No allowance is made for holes in backs of cup wheels, regardless of diameter.

CARBORUNDUM AND ALOXITE SPECIAL SHAPED WHEELS



668 662 661 663 669 685 664 665 670

FIG. 994



769 768 772 765 766 771 767

FIG. 995

WHEELS FOR LANDIS GRINDERS

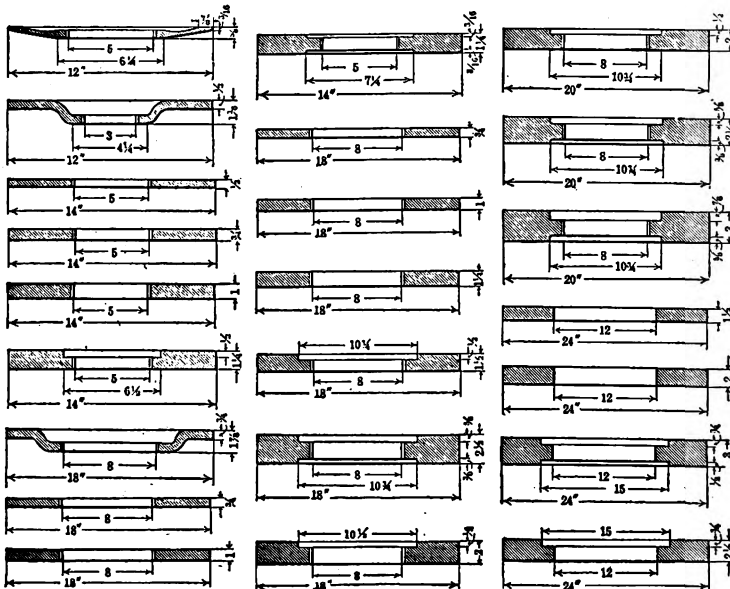


FIG. 996

FIG. 997

FIG. 998

WHEELS FOR CINCINNATI MILLING MACHINE CO. GRINDERS

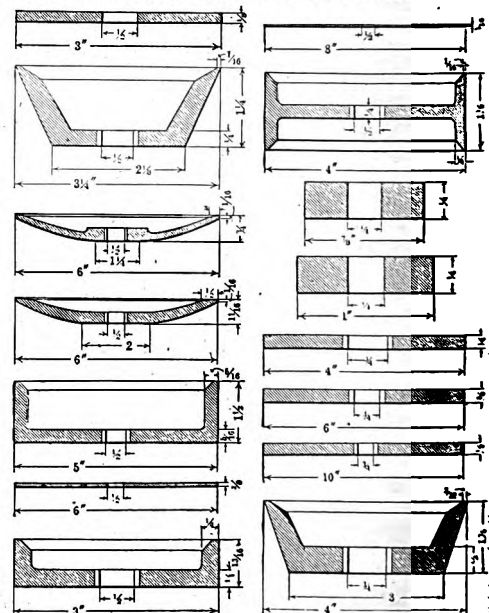


FIG. 999

FIG. 1000

WHEELS FOR WILMARTH & NORMAN GRINDERS

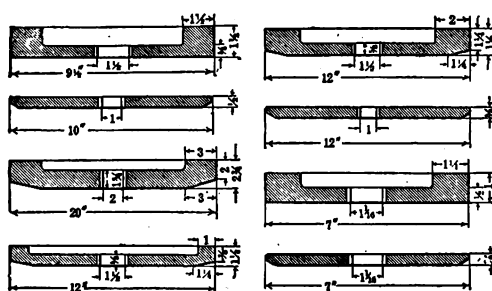


FIG. 1001

FIG. 1002

WHEELS FOR BRIDGEPORT GRINDERS

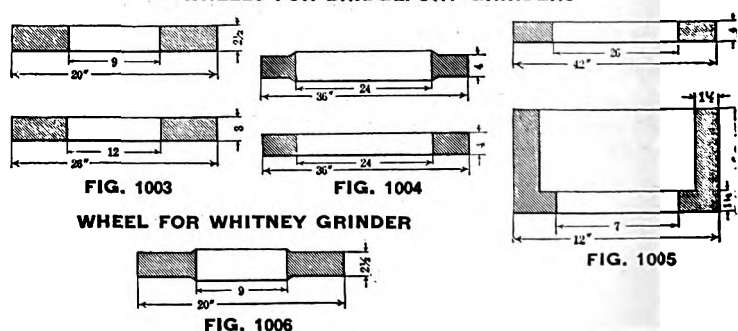


FIG. 1003

FIG. 1004

FIG. 1005

WHEEL FOR WHITNEY GRINDER

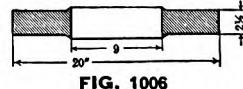


FIG. 1006

CARBORUNDUM AND ALOXITE SPECIAL SHAPED WHEELS

WHEELS FOR MUMMERT-DIXON GRINDERS

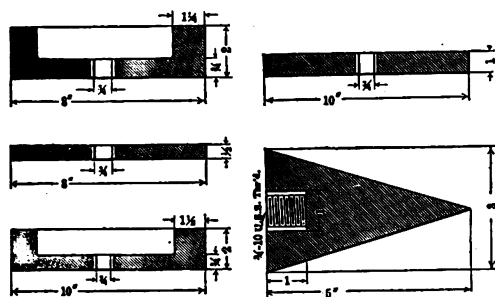


FIG. 1007

FIG. 1008

WHEELS FOR NORTON GRINDERS

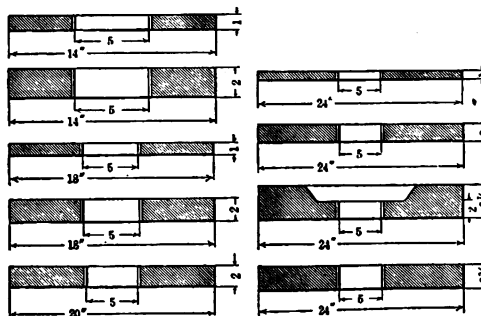


FIG. 1009

FIG. 1010

WHEELS FOR DIAMOND GRINDERS

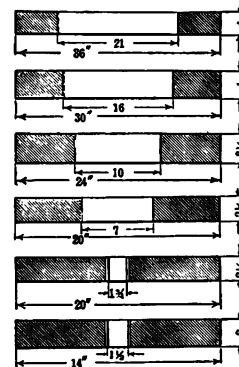


FIG. 1011

WHEELS FOR BROWN & SHARPE GRINDERS

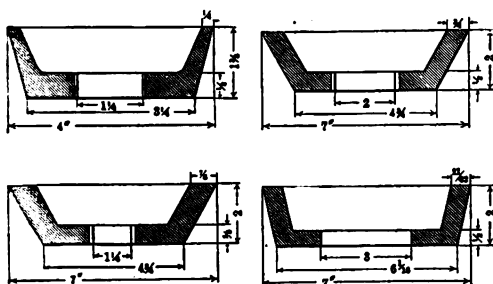


FIG. 1012

FIG. 1013

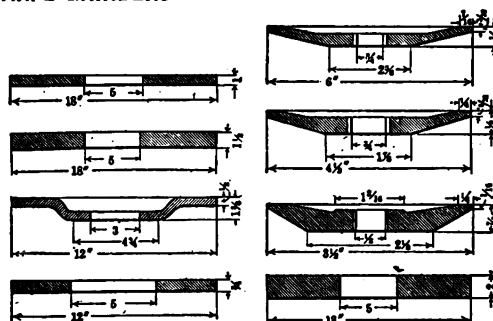


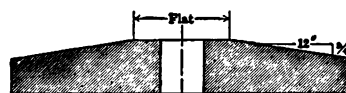
FIG. 1014

FIG. 1015

WE CAN FURNISH SPECIAL SHAPED WHEELS FOR ANY MAKE OF GRINDING MACHINE

TAPERED WHEELS

CARBORUNDUM AND ALOXITE
1/4-INCH TAPER, ONE SIDE



Taper 1/4" per Foot

PRICE LIST

FIG. 1016

Diameter		Thickness of Wheels in Inches and Millimeters																D. diam.	
In.	mm.	In. 1/8	1/4	3/8	1/2	5/8	3/4	7/8	1	1 1/8	1 1/4	1 3/8	1 1/2	1 5/8	1 3/4	1 7/8	2	mm.	In.
10	250	\$ 4.35	\$ 5.65	\$ 6.95	\$ 8.25	\$ 9.65	\$10.95	\$12.25	\$13.55	\$14.85	\$16.15	\$17.45	\$18.75	\$20.10	\$21.45	\$22.75	\$24.05	250	10
12	305	5.20	7.00	8.80	10.50	12.30	14.10	15.90	17.70	19.45	21.20	23.00	24.80	26.55	28.30	30.10	31.90	305	12
14	355	6.40	8.70	11.10	13.40	15.70	18.00	20.40	22.70	25.00	27.30	29.65	32.00	34.30	36.60	38.95	41.30	355	14
16	405	7.95	10.95	13.85	16.85	19.85	22.75	25.75	28.75	31.70	34.65	37.60	40.55	43.55	46.55	49.50	52.45	405	16
18	460	9.60	13.30	17.00	20.70	24.40	28.10	31.80	35.50	39.15	42.80	46.50	50.20	53.90	57.60	61.30	65.00	460	18
20	510	11.20	15.30	19.40	23.50	27.60	31.70	35.80	39.90	44.00	48.10	52.20	56.30	60.40	64.50	68.60	72.70	510	20
22	560	12.80	17.30	21.60	25.90	30.20	34.50	38.80	43.10	47.40	51.70	56.00	60.30	64.60	68.90	73.20	77.50	560	22
24	610	14.40	19.30	24.20	29.10	34.00	38.90	43.80	48.70	53.60	58.50	63.40	68.30	73.20	78.10	83.00	87.90	610	24
26	660	16.00	21.30	26.60	31.90	37.20	42.50	47.80	53.10	58.40	63.70	69.00	74.30	79.60	84.90	90.20	95.50	660	26
28	710	17.60	23.30	28.60	33.90	39.20	44.50	49.80	55.10	60.40	65.70	71.00	76.30	81.60	86.90	92.20	97.50	710	28
30	760	19.20	25.30	30.60	35.90	41.20	46.50	51.80	57.10	62.40	67.70	73.00	78.30	83.60	88.90	94.20	99.50	760	30
32	810	20.80	27.30	32.60	37.90	43.20	48.50	53.80	59.10	64.40	69.70	75.00	80.30	85.60	90.90	96.20	101.50	810	32
34	865	22.40	29.30	34.60	39.90	45.20	50.50	55.80	61.10	66.40	71.70	77.00	82.30	87.60	92.90	98.20	103.50	865	34
36	915	24.00	31.30	36.60	41.90	47.20	52.50	57.80	63.10	68.40	73.70	79.00	84.30	89.60	94.90	100.20	105.50	915	36
38	965	25.60	33.30	38.60	43.90	49.20	54.50	59.80	65.10	70.40	75.70	81.00	86.30	91.60	96.90	102.20	107.50	965	38
40	1015	27.20	35.30	40.60	45.90	51.20	56.50	61.80	67.10	72.40	77.70	83.00	88.30	93.60	98.90	104.20	109.50	1015	40
42	1070	28.80	37.30	42.60	47.90	53.20	58.50	63.80	69.10	74.40	79.70	85.00	90.30	95.60	100.90	106.20	111.50	1070	42
44	1120	30.40	39.30	44.60	49.90	55.20	60.50	65.80	71.10	76.40	81.70	87.00	92.30	97.60	102.90	108.20	113.50	1120	44
46	1170	32.00	41.30	46.60	51.90	57.20	62.50	67.80	73.10	78.40	83.70	89.00	94.30	99.60	104.90	110.20	115.50	1170	46
48	1220	33.60	43.30	48.60	53.90	59.20	64.50	69.80	75.10	80.40	85.70	91.00	96.30	101.60	106.90	112.20	117.50	1220	48
50	1270	35.20	45.30	50.60	55.90	61.20	66.50	71.80	77.10	82.40	87.70	93.00	98.30	103.60	108.90	114.20	119.50	1270	50
52	1320	36.80	47.30	52.60	57.90	63.20	68.50	73.80	79.10	84.40	89.70	95.00	100.30	105.60	110.90	116.20	121.50	1320	52
54	1370	38.40	49.30	54.60	59.90	65.20	70.50	75.80	81.10	86.40	91.70	97.00	102.30	107.60	112.90	118.20	123.50	1370	54
56	1425	40.00	51.30	56.60	61.90	67.20	72.50	77.80	83.10	88.40	93.70	99.00	104.30	109.60	114.90	120.20	125.50	1425	56
58	1475	41.60	53.30	58.60	63.90	69.20	74.50	79.80	85.10	90.40	95.70	101.00	106.30	111.60	116.90	122.20	127.50	1475	58
60	1525	43.20	55.30	60.60	65.90	71.20	76.50	81.80	87.10	92.40	97.70	103.00	108.30	113.60	118.90	124.20	129.50	1525	60

TAPERED WHEELS

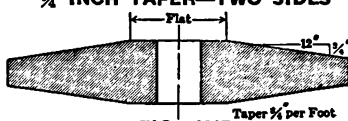
CARBORUNDUM AND ALOXITE
1/4 INCH TAPER—TWO SIDES

FIG. 1017

PRICE LIST

Diameter		Thickness of Wheels in Inches and Millimeters																Diam.	
In.	mm.	In. 1/4 mm. 6	1/2 12	3/4 19	1 25	1 1/4 32	1 1/2 38	1 3/4 45	2 50	2 1/4 56	2 1/2 63	2 3/4 70	3 75	3 1/4 82	3 1/2 88	3 3/4 95	4 100	mm.	In.
10	250	\$5.10	\$6.40	\$7.70	\$9.00	\$10.40	\$11.70	\$13.00	\$14.30	\$15.60	\$16.90	\$18.20	\$19.50	\$20.85	\$22.20	\$23.50	\$24.80	250	10
12	305	6.20	8.00	9.80	11.50	13.30	15.10	16.90	18.70	20.45	22.20	24.00	25.80	27.55	29.30	31.10	32.90	305	12
14	355	7.90	10.20	12.60	14.90	17.20	19.50	21.80	24.20	26.50	28.80	31.15	33.50	35.80	38.10	40.45	42.80	355	14
16	405	10.20	13.20	16.10	19.10	22.10	25.00	28.00	31.00	33.95	36.90	39.85	42.80	45.80	48.80	51.75	54.70	405	16
18	460	12.60	16.30	20.00	23.70	27.40	31.10	34.80	38.50	42.15	45.80	49.50	53.20	56.90	60.60	64.30	68.00	460	18
20	510	20.30	24.80	29.40	33.90	38.50	43.00	47.60	52.15	56.70	61.35	65.90	70.50	75.00	79.50	84.00	88.50	510	20
22	560	31.10	36.60	42.10	47.70	53.20	58.70	64.35	70.00	75.50	81.00	86.50	92.00	97.50	103.00	108.50	114.00	560	22
24	610	39.00	45.60	52.30	59.00	65.70	72.40	79.10	85.80	92.50	99.20	105.90	112.60	119.30	126.00	132.70	139.40	610	24
26	660	56.40	64.50	72.60	80.70	88.80	96.90	105.00	113.10	121.20	129.30	137.40	145.50	153.60	161.70	169.80	177.90	660	26
28	710	71.00	80.00	89.00	98.00	107.00	116.00	125.00	134.00	143.00	152.00	161.00	170.00	179.00	188.00	197.00	206.00	710	28
30	760	89.00	99.00	109.00	119.00	129.00	139.00	149.00	159.00	169.00	179.00	189.00	199.00	209.00	219.00	229.00	239.00	760	30
32	810	111.00	123.00	135.00	147.00	159.00	171.00	183.00	195.00	207.00	219.00	231.00	243.00	255.00	267.00	279.00	291.00	810	32
34	865	130.00	143.00	157.00	171.00	185.00	199.00	213.00	227.00	241.00	255.00	269.00	283.00	297.00	311.00	325.00	339.00	865	34
36	915	151.00	166.00	181.00	196.00	211.00	226.00	241.00	256.00	271.00	286.00	301.00	316.00	331.00	346.00	361.00	376.00	915	36
38	965	204.00	221.00	238.00	255.00	272.00	289.00	306.00	323.00	340.00	357.00	374.00	391.00	408.00	425.00	442.00	459.00	965	38
40	1015	231.00	250.00	269.00	288.00	307.00	326.00	345.00	364.00	383.00	402.00	421.00	440.00	459.00	478.00	497.00	516.00	1015	40
42	1070	301.00	321.00	341.00	362.00	382.00	403.00	423.00	443.00	463.00	483.00	503.00	523.00	543.00	563.00	583.00	603.00	1070	42
44	1120	336.00	359.00	382.00	405.00	427.00	450.00	473.00	496.00	519.00	542.00	565.00	588.00	611.00	634.00	657.00	680.00	1120	44
46	1170	374.00	399.00	424.00	449.00	474.00	499.00	524.00	549.00	574.00	599.00	624.00	649.00	674.00	699.00	724.00	749.00	1170	46
48	1220	413.00	441.00	468.00	495.00	522.00	549.00	576.00	603.00	630.00	657.00	684.00	711.00	738.00	765.00	792.00	819.00	1220	48
50	1270	515.00	545.00	574.00	604.00	633.00	663.00	692.00	721.00	750.00	779.00	808.00	837.00	866.00	895.00	924.00	953.00	1270	50
52	1320	566.00	598.00	630.00	662.00	694.00	726.00	758.00	790.00	822.00	854.00	886.00	918.00	950.00	982.00	1014.00	1046.00	1320	52
54	1370	619.00	654.00	688.00	722.00	757.00	791.00	825.00	859.00	893.00	927.00	961.00	995.00	1029.00	1063.00	1097.00	1131.00	1370	54
56	1425	674.00	711.00	748.00	785.00	822.00	859.00	896.00	933.00	970.00	1007.00	1044.00	1081.00	1118.00	1155.00	1192.00	1229.00	1425	56
58	1475	733.00	772.00	812.00	851.00	891.00	930.00	969.00	1008.00	1047.00	1086.00	1125.00	1164.00	1203.00	1242.00	1281.00	1320.00	1475	58
60	1525	796.00	835.00	874.00	913.00	952.00	991.00	1030.00	1069.00	1108.00	1147.00	1186.00	1225.00	1264.00	1303.00	1342.00	1381.00	1525	60

1/4 INCH TAPER—TWO SIDES

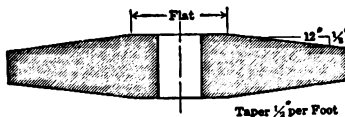


FIG. 1018

PRICE LIST

Diameter		Thickness of Wheels in Inches and Millimeters																Diam.	
In.	mm.	In. 1/4 mm. 6	1/2 12	3/4 19	1 25	1 1/4 32	1 1/2 38	1 3/4 45	2 50	2 1/4 56	2 1/2 63	2 3/4 70	3 75	3 1/4 82	3 1/2 88	3 3/4 95	4 100	mm.	In.
10	250	\$4.60	\$5.90	\$7.20	\$8.50	\$9.80	\$11.20	\$12.50	\$13.80	\$15.10	\$16.40	\$17.70	\$19.00	\$20.35	\$21.70	\$23.00	\$24.30	250	10
12	305	5.70	7.50	9.30	11.00	12.80	14.60	16.40	18.20	19.95	21.70	23.50	25.30	27.05	28.80	30.60	32.40	305	12
14	355	6.90	9.20	11.60	13.90	16.20	18.50	20.80	23.20	25.50	27.80	30.15	32.50	34.80	37.10	39.45	41.80	355	14
16	405	8.20	11.20	14.10	17.10	20.10	23.00	26.00	29.00	31.95	34.90	37.85	40.80	43.80	46.80	49.75	52.70	405	16
18	460	10.10	13.80	17.50	21.20	24.90	28.60	32.30	36.00	39.65	43.30	47.00	50.70	54.40	58.10	61.80	65.50	460	18
20	510	17.30	21.80	26.40	30.90	35.50	40.00	44.60	49.15	53.70	58.35	62.90	67.50	72.00	76.50	81.00	85.50	510	20
22	560	27.10	32.60	38.10	43.70	49.20	54.70	60.20	65.70	71.20	76.70	82.20	87.70	93.20	98.70	104.20	109.70	560	22
24	610	34.00	40.60	47.30	54.00	60.70	67.40	74.10	80.80	87.50	94.20	100.90	107.60	114.30	121.00	127.70	134.40	610	24
26	660	49.40	57.50	65.60	73.70	81.80	89.90	98.00	106.10	114.20	122.30	130.40	138.50	146.60	154.70	162.80	170.90	660	26
28	710	62.00	71.00	80.00	89.00	98.00	107.00	116.00	125.00	134.00	143.00	152.00	161.00	170.00	179.00	188.00	197.00	710	28
30	760	77.00	87.00	97.00	107.00	117.00	127.00	137.00	147.00	157.00	167.00	177.00	187.00	197.00	207.00	217.00	227.00	760	30
32	810	95.00	107.00	119.00	131.00	143.00	155.00	167.00	179.00	191.00	203.00	215.00	227.00	239.00	251.00	263.00	275.00	810	32
34	865	109.00	122.00	136.00	150.00	163.00	177.00	190.00	204.00	218.00	232.00	246.00	260.00	274.00	288.00	302.00	316.00	865	34
36	915	127.00	142.00	157.00	172.00	187.00	202.00	217.00	232.00	247.00	262.00	277.00	292.00	307.00	322.00	337.00	352.00	915	36
38	965	175.00	192.00	209.00	226.00	243.00	260.00	277.00	294.00	311.00	328.00	345.00	362.00	379.00	396.00	413.00	430.00	965	38
40	1015	197.00	216.00	235.00	253.00	272.00	291.00	310.00	329.00	348.00	367.00	386.00	405.00	424.00	443.00	462.00	481.00	1015	40
42	1070	263.00	283.00	303.00	324.00	344.00	365.00	385.00	406.00	426.00	446.00	466.00	486.00	506.00	526.00	546.00	566.00	1070	42
44	1120	293.00	316.00	339.00	362.00	384.00	407.00	430.00	453.00	476.00	499.00	522.00	545.00	568.00	591.00	614.00	637.00	1120	44
46	1170	324.00	349.00	374.00	399.00	424.00	449.00	474.00	499.00	524.00	549.00	574.00	599.00	624.00	649.00	674.00	699.00	1170	46
48	1220	356.00	384.00	411.00	438.00	465.00	492.00	519.00	546.00	573.00	600.00	627.00	654.00	681.00	708.00	735.00	762.00	1220	48
50	1270	449.00	479.00	508.00	538.00	567.00	597.00	626.00	656.00	685.00	715.00	744.00	773.00	802.00	831.00	860.00	889.00	1270	50
52	1320	490.00	522.00	554.00	586.00	618.00	650.00	682.00	714.00	746.00	778.00	810.00	842.00	874.00	906.00	938.00	970.00	1320	52
54	1370	533.00	568.00	602.00	636.00	670.00	704.00	738.00	772.00	806.00	840.00	874.00	908.00	942.00	976.00	1010.00	1044.00	1370	54
56	1425	579.00	616.00	653.00	690.00	727.00	764.00	801.00	838.00	875.00	912.00	949.00	986.00	1023.00	1060.00	1097.00	1134.00	1425	56
58	1475	628.00	667.00	707.00	746.00	786.00	825.00	864.00	903.00	942.00	981.00	1020.00	1059.00	1098.00	1137.00	1176.00	1215.00	1475	58
60	1525	679.00	721.00	764.00	806.00	849.00	891.00	933.00	975.00	1017.00	1059.00	1101.00	1143.00	1185.00	1227.00	1269.00	1311.00	1525	60

STEEL CENTER WHEELS

CARBORUNDUM AND ALOXITE

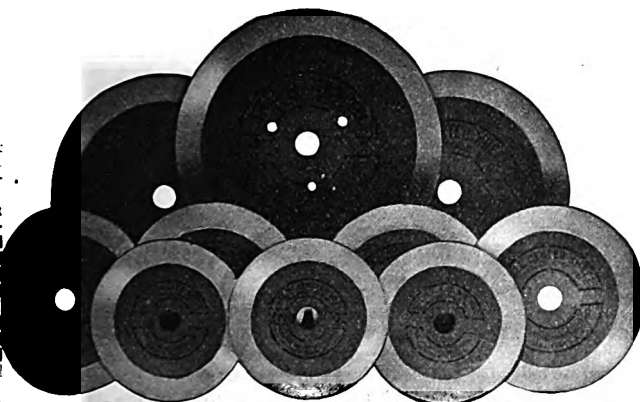


FIG. 1021

Carborundum steel center wheels consist of a steel center or plate with a rim or periphery of Carborundum, bonded with an elastic bond to the steel center. These wheels have several distinguishing features, readily appreciated by the stone working trades. The steel center wheels can be run with safety at a very high speed, and the danger of breakage from side-strain is minimized.

The wheels can be re-rimmed with Carborundum, provided the steel centers are returned in good condition.

The recommended operating speed for these wheels is from 6,500 to 7,500 surface feet per minute, and they should be operated with a plentiful supply of water, striking the wheel at the point of contact under a pressure of about 60 pounds per square inch.

Steel center wheels are made in diameters ranging from 12" to 24" in standard thicknesses. Wheels of larger diameter can be furnished if desired.

PRICE LIST CARBORUNDUM STEEL CENTER WHEELS

Outside Diameter	Per Wheel	Re-rimming	Operating Speed Based on 7,000 Surface Feet Per Minute	Outside Diameter	Per Wheel	Re-rimming	Operating Speed Based on 7,000 Surface Feet Per Minute
12"	\$5.20	\$4.60	2228	18"	\$8.70	\$7.50	1486
14"	6.45	5.65	1910	20"	11.05	9.65	1338
16"	7.70	6.70	1672	24"	13.25	11.45	1114

POT BALLS AND SPIDER OR SKILLET WHEELS

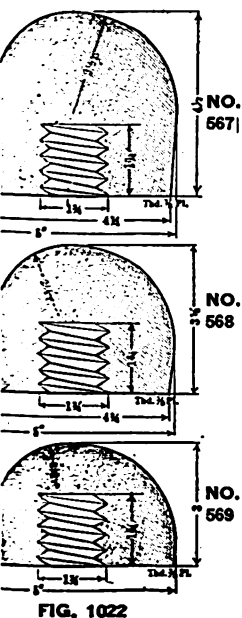


FIG. 1022

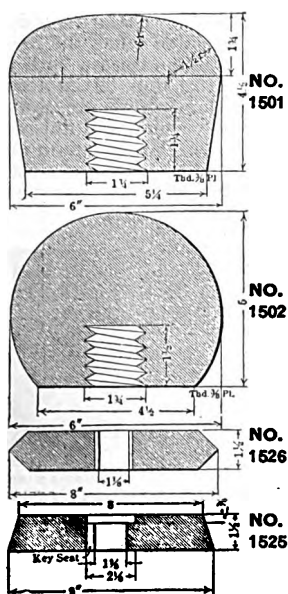
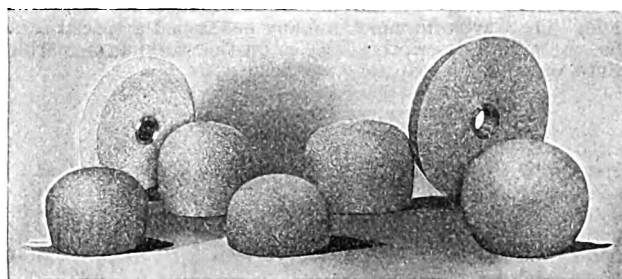


FIG. 1023



568 1526 567 569 1501 1525 1502
FIG. 1024

These cuts illustrate a few styles only of the Pot Balls and Spider or Skillet Wheels that we are prepared to furnish.

PRICES

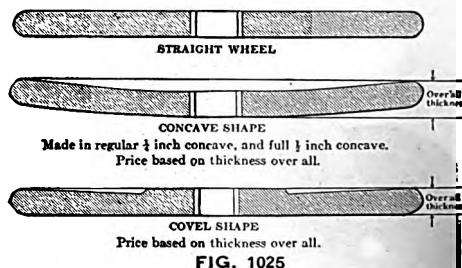
Number....	567	568	569	1501	1502	1526	1525
Price Each..	\$8.10	6.80	5.70	10.70	11.90	6.90	8.40

ALOXITE WHEELS FOR SAW GUMMING

Saw gumming wheels manufactured by The Carborundum Company are made of Aloxite. Their fast, cool cutting qualities, together with the fact that they hold their shape and show long life, have earned for Aloxite saw gumming wheels a reputation of quality among saw filers.

Different conditions govern the character of the wheel to be used. Aloxite saw gummers are made in both the vitrified and shellac bonds and The Carborundum Company is in a position to supply wheels to meet every requirement of the saw mill and woodworking plant. The three most popular and practical shapes of Aloxite saw gumming wheels are the straight wheel, the concave and the covel shapes illustrated.

These wheels are made with any shape face desired. See preceding page.



CARBORUNDUM PRODUCTS FOR THE GLASS TRADE

Carborundum and Aloxite wheels and grains are to-day recognized as important factors in the grinding of glass. The Carborundum Company, by the aid of two such superior abrasives as Carborundum and Aloxite have been able to develop artificial stones for the glass cutter's trade that have proven wonderfully efficient.

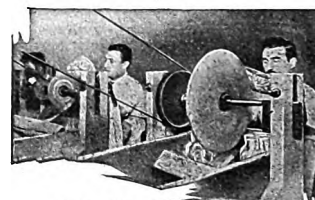


BEVELING MIRRORS—CARBORUNDUM GRAINS
FIG. 1026

Aloxite wheels for mitre cutting, checkering and lacing do rapid work without chipping. For smoothing mitres in plate glass and for punties and beading, Aloxite wheels have established records. They are also recognized as the most efficient wheels for tumbler work, such as edge grinding and beveling, fluting, cutting punties, etc.

An Aloxite glass wheel will hold a sharp mitre or sharp profile several times longer than a natural stone, and will

cut much more quickly. For edging rimless and beveled edge lenses, Aloxite wheels have proven to be the ideal smoothing stones. These wheels work equally efficient on automatic hand-edging machines. Aloxite grains and powders are extensively used for lens surfacing. Carborundum and Aloxite glass wheels provide efficient means of roughing bevels as well as for mitre cutting in plate glass. They also afford the most rapid, clean, and efficient method of cutting air vents in gas light globes, as well as in grinding the edges of opaque lamp shades. Carborundum grains for glass grinding show their greater efficiency when used for roughing bevels on plate glass. For this work Carborundum has been indisputably proven to be the most efficient of all abrasives.

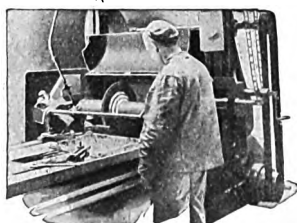


GLASS CUTTING—ALOXITE WHEELS
FIG. 1027

A special catalogue has been issued by The Carborundum Company under the title of "Carborundum Products for the Glass Trade." This catalogue may be obtained upon application.

CARBORUNDUM PRODUCTS FOR THE STONE TRADE

Under the title of "Carborundum Products for the Stone Trade," The Carborundum Company has issued a special catalogue containing descriptive articles on the working of marble, granite, onyx, slate, soapstone, artificial stone, etc.

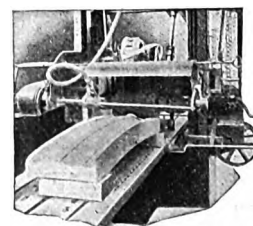


COPING MARBLE WITH A CARBORUNDUM WHEEL
FIG. 1028

Carborundum has revolutionized stone working methods. In the coping, surfacing, slotting and moulding of marble, the surfacing of granite, and various other operations of the stone-working trades it has made possible a remarkable reduction in the time required and has increased efficiency.

The adaptability of Carborundum to the working of stone is shown by the results produced by Carborundum coping wheels. Practically no stone is too hard for them to cut. Carborundum coping wheels are made in three styles: solid coping wheels, steel center wheels, and inserted tooth saws.

The value of Carborundum in the moulding of marble is best appreciated when the present-day methods and the results obtained are contrasted with the old process of cutting moulds with the steel tool. It is a contrast rather than a comparison. Carborundum wheels are now extensively used with remarkable success for turning and finishing columns in all classes of stone. The value of Carborundum and Aloxite blocks for gritting and honing marble, onyx and slate has been demonstrated and Carborundum grains have become the standard material for polishing granite after shotting.



MOULDING MARBLE WITH A CARBORUNDUM WHEEL
FIG. 1029

For surfacing marble, terrazzo, and mosaic floors Carborundum blocks are made in a wide variety of shapes, sizes, and grades for both machine and hand work; and in tooling artificial stone and limestone, Carborundum wheels have materially simplified the operation.

CARBORUNDUM AND ALOXITE GRAINS



FIG. 1030

Crude Carborundum when taken from the electric furnace is usually in the form of large masses of crystals. Very frequently these crystals are exceedingly beautiful in color and of brilliant adamantine luster. They form a very effective and attractive material for decorative purposes, particularly for show cases, window displays and sign boards.

The masses of crystals are reduced to grain form by means of heavy roll crushers which break up the aggregations of crystals. The product thus obtained consists of a mixture of Carborundum grains of sizes varying from that of wheat kernels to that of impalpable powders. In this form it receives a chemical treatment which removes all foreign material and leaves only the pure Carborundum grains. After the purification treatment the grains are passed through dryers and are then separated into various sizes through grading screens. These screens are numbered in accordance with the number of threads per linear inch and the product from each screen is numbered the same as the screen through which it has passed; thus No. 50 grain indicates that the grain is of such a size that it would pass through a No. 50 mesh screen, which is one having 50 threads to the linear inch, but would not pass through a screen having 60 threads to the linear inch.

The Carborundum Company prepares and carries in stock



FIG. 1031

grains of the following numbers: 6, 8, 10, 12, 14, 16, 20, 24, 30, 36, 40, 50, 60, 70, 80, 90, 100, 120, 150, 180, 220. Grains finer than No. 220 are known as powders and are graded by settling in water. Their fineness is indicated by the length of time which is required for them to settle through a certain depth of water and is represented by the letters F, FF, FFF. F powder is the coarsest, and FFF the finest. More accurately graded powders are known as "minute" powders, and are also graded by settling in water. These powders are made in finenesses designated as 1-minute, 4-minute, 6-minute, 10-minute, 15-minute, 30-minute and 60-minute powders, which represents in each case the length of time required for the powder to settle through a definite depth of water.

The crude Aloxite is received at Niagara Falls from the French and Canadian works in lump form, and is crushed by means of jaw and roll crushers. The grains are then chemically treated, washed, dried and graded by very similar methods to those employed in the preparation of Carborundum grains.

The Carborundum Company prepares and carries in stock Aloxite grains of the following numbers: 6, 8, 10, 12, 14, 16, 20, 24, 30, 36, 40, 50, 60, 70, 80, 90, 100, 120, 150, 180 and 220. Grains finer than No. 220 are graded and designated in a similar manner to that employed in the case of Carborundum and are known as F, FF, FFF powders. The more accurately graded powders are known as "minute" powders and are also graded by settling in water.

The finished grains and powders, both Carborundum and Aloxite, receive a thorough inspection with the object of checking their purity and size before being passed for shipment.

PRICE LIST OF CARBORUNDUM GRAINS AND POWDERS

CARBORUNDUM GRAINS AND POWDERS ARE GRADED IN THE FOLLOWING SIZES

6-8-10-12-14-16-20-24-30-36-40-50-60-70-80-90-100-120-150-180-220-F-FF-FFF

Grains and Powders in all Grits from 6 to FFF packed for shipment as follows:

300 pound kegs.....	\$0.23	per pound
200 pound kegs.....	.23	per pound
150 pound kegs.....	.23	per pound
100 pound kegs.....	.25½	per pound
50 pound drums.....	.25½	per pound
25 pound drums.....	.27	per pound
10 pound bags.....	.34½	per pound
5 pound bags.....	.34½	per pound
1 pound bags.....	.37½	per pound
1 pound cans.....	.80	per pound
½ pound bags.....	.45	per pound

MINUTE POWDERS

Price in any Quantity

1 minute.....	\$0.45	per pound
4 minute.....	.45	per pound
6 minute.....	.45	per pound
10 minute.....	.75	per pound
15 minute.....	1.50	per pound
30 minute.....	1.50	per pound
60 minute.....	1.50	per pound

PRICE LIST OF ALOXITE GRAINS AND POWDERS

ALOXITE GRAINS AND POWDERS ARE GRADED IN THE FOLLOWING GRITS

6-8-10-12-14-16-20-24-30-36-40-50-60-70-80-90-100-120-150-180-220

F, FF, FFF

Grains and Powders in all Grits from 6 to FFF packed for shipment as follows:

360 pound kegs.....	\$0.23	per pound	In 10 pound bags.....	\$0.34½	per pound
175 pound kegs.....	.23	per pound	In 5 pound tins.....	.34½	per pound
100 pound kegs.....	.25½	per pound	In 1 pound tins.....	.37½	per pound
50 pound drums.....	.25½	per pound	In ½ pound tins.....	.45	per pound
25 pound drums.....	.27	per pound			

CARBORUNDUM PAPER AND CLOTH AND ALOXITE CLOTH

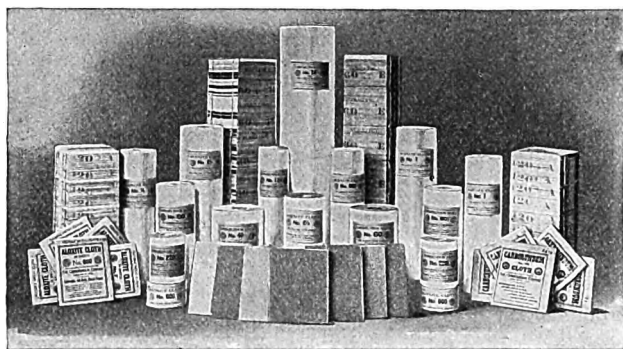


FIG. 1032
PRICE LIST OF ALOXITE CLOTH

Grit Numbers	SHEETS 9 x 11	50-YARD ROLLS PRICE PER ROLL		
	Price per Ream	Width 9 Inches	Width 18 Inches	Width 27 Inches
Powder FF	\$30.00	\$11.65	\$23.05	\$32.15
Powder F	30.00	11.65	23.05	32.15
3/0-180	30.00	11.65	23.05	32.15
2/0-150	30.00	11.65	23.05	32.15
0-120	30.00	11.65	23.05	32.15
100-100	30.00	11.65	23.05	32.15
1/2-90	31.20	12.25	24.25	33.85
1-80	32.75	13.05	25.85	36.10
1 1/2-70	34.30	14.00	27.75	38.80
2-60	36.50	14.95	29.65	41.50
2 1/2-46	39.40	16.15	32.05	44.90
3-36	42.50	17.50	34.65	48.60
3 1/2-24	46.00	18.95	37.60	52.80

PRICE LIST OF ALOXITE CLOTH IN NARROW ROLLS
50 YARDS IN LENGTH

Intermediate Sizes to be charged at next higher list

Width in Inches	GRIT NUMBERS							
	100 and finer	90 1/2	80 1	70 1 1/2	60 2	46 2 1/2	36 3	24 3 1/2
3	\$ 4.10	\$4.30	\$4.55	\$4.90	\$5.10	\$5.50	\$6.00	\$6.50
3 1/2	4.75	4.95	5.25	5.65	6.00	6.50	7.00	7.60
4	5.35	5.65	6.00	6.40	6.80	7.35	7.95	8.60
5	6.65	7.00	7.40	7.95	8.45	9.15	9.85	10.70
6	7.90	8.30	8.85	9.45	10.10	10.90	11.75	12.75
7	9.15	9.65	10.25	11.00	11.70	12.65	13.65	14.85
8	10.40	10.90	11.65	12.50	13.35	14.40	15.60	16.90
10	12.95	13.60	14.50	15.55	16.60	17.95	19.40	21.05
12	15.45	16.20	17.30	18.60	19.85	21.45	23.20	25.20
14	18.00	18.90	20.20	21.65	23.10	25.00	27.05	29.35
15	19.25	20.30	21.60	23.20	24.75	26.75	28.90	31.40
16	20.55	21.60	23.00	24.70	26.40	28.50	30.85	33.50
20	25.60	26.90	28.70	30.80	32.90	35.60	38.50	41.80
24	30.60	32.20	34.35	36.90	39.40	42.60	46.15	50.05

THE ECONOMY ROLLS OF ALOXITE CLOTH

PRACTICAL—CONVENIENT—ECONOMICAL



FIG.

1033

ALOXITE CLOTH—the cloth that cuts—is put up in Economy Rolls of 1/2, 3/4, 1, 1 1/2, 2 and 2 1/2-inch widths. Just put the rolls on a rack—keep them on the bench or in a drawer—always handy. Instead of tearing a strip from a sheet, snip a piece in the width and length desired from the roll. No loss of time, no wasting of the cloth. The rolls are put up in any grit desired. Each roll snugly wound on a metal spool.

Aloxite Cloth cuts faster, gives a better finish, lasts longer than emery cloth.

The quality of the materials used in the making of Carborundum paper and cloth and Aloxite cloth enables The Carborundum Company to produce abrasive materials of this class that are unsurpassed.

Aloxite cloth for general shop work is sharp and clean cutting and it retains its sharpness, far surpassing emery cloth in these qualities.

For special requirements of the machine shop, such as rubbing down paint on metal work, cleaning commutators etc., Carborundum paper and cloth are particularly adapted.

PRICE LIST OF CARBORUNDUM METAL CLOTH

Grit Numbers	SHEETS 9 x 11	50-YARD ROLLS PRICE PER ROLL		
	Price per Ream	Width 9 Inches	Width 18 Inches	Width 27 Inches
Powder FF	\$32.15	\$11.65	\$23.05	\$32.15
Powder F	32.15	11.65	23.05	32.15
3/0-180	32.15	11.65	23.05	32.15
2/0-150	32.15	11.65	23.05	32.15
0-120	32.15	11.65	23.05	32.15
100-100	32.15	11.65	23.05	32.15
1/2-90	33.85	12.25	24.25	33.85
1-80	36.10	13.05	25.85	36.10
1 1/2-70	38.80	14.00	27.75	38.80
2-60	42.10	15.15	30.25	42.10
2 1/2-50	45.50	16.40	32.50	45.50
3-40	49.00	17.65	35.00	49.00
3 1/2-36	52.65	18.90	37.60	52.65
4-30	56.25	20.20	40.10	56.25
4 1/2-24	62.15	22.30	44.30	62.15
5-20		24.80	49.30	69.25

HEAVY COATED ALOXITE BELT CLOTH IN 50 YARD ROLLS

Width in Inches	60 2	46 2 1/2	36 3	24 3 1/2	20 4	16 4 1/2
3	\$5.85	\$6.30	\$6.90	\$7.50	\$8.35	\$9.45
3 1/2	6.90	7.50	8.05	8.75	9.65	11.00
4	7.80	8.45	9.15	9.90	11.00	12.40
5	9.70	10.50	11.35	12.30	13.65	15.15
6	11.60	12.55	13.50	14.65	16.25	18.10
7	13.45	14.55	15.70	17.05	18.90	21.00
8	15.35	16.55	17.95	19.45	21.60	24.00
9	17.20	18.55	20.15	21.80	24.25	27.00
10	19.10	20.65	22.30	24.20	26.90	30.00
12	22.85	24.65	26.70	29.00	32.20	36.00
14	26.55	28.75	31.10	33.75	36.85	42.00
15	28.45	30.75	33.25	36.10	40.20	45.00
16	30.35	32.75	35.50	38.55	42.85	48.00
18	34.10	36.85	39.85	43.25	48.15	54.00
20	37.85	40.95	44.30	48.05	53.50	61.00
24	45.30	49.00	53.05	57.55	64.10	73.00
27	47.75	51.65	55.90	60.70	67.60	77.00
30	53.00	57.40	62.10	67.45	75.15	85.00

PRICE LIST OF ALOXITE CLOTH ECONOMY ROLLS

50 YARDS IN LENGTH

Width in Inches	GRIT NUMBERS							
	100 and finer	90 1/2	80 1	70 1 1/2	60 2	46 2 1/2	36 3	24 3 1/2
1/2-1/2	\$1.20	\$1.25	\$1.30	\$1.35	\$1.45	\$1.50	\$1.55	\$1.60
3/4	1.55	1.60	1.65	1.75	1.85	1.95	2.05	2.15
1	1.85	1.90	2.00	2.15	2.25	2.35	2.50	2.65
1 1/2	2.50	2.60	2.75	2.90	3.05	3.25	3.45	3.65
2	3.10	3.25	3.40	3.65	3.85	4.15	4.45	4.75
2 1/2	3.75	3.90	4.15	4.40	4.70	5.00	5.40	5.75

CARBORUNDUM PAPER DISCSMADE IN THE FOLLOWING GRITS
SINGLE COATED

LIST PRICE PER 100

Dia. in Inch.	100	90	80	70	60	50	40	36	30	24	20
6"	\$1.85	\$2.00	\$2.15	\$2.35	\$2.60	\$2.90	\$3.20	\$3.50	\$3.80	\$4.20	\$4.75
8"	3.30	3.50	3.80	4.15	4.50	5.05	5.55	6.10	6.60	7.30	8.20
10"	5.35	5.70	6.20	6.75	7.40	8.20	9.05	9.85	10.70	11.80	13.30
12"	7.55	8.00	8.70	9.40	10.25	11.40	12.50	13.60	14.75	16.20	18.30
14"	11.10	11.75	12.75	13.80	15.00	16.60	18.20	19.80	21.50	23.60	26.60
15"	13.00	13.80	14.90	16.10	17.60	19.30	21.20	23.00	24.90	27.30	30.70
16"	14.90	15.80	17.20	18.40	19.90	22.00	24.10	26.20	28.20	31.00	34.80
18"	18.70	19.80	21.40	23.10	25.00	27.60	31.10	32.80	35.30	38.70	43.50
20"	22.50	23.80	25.80	27.80	30.20	33.30	37.50	39.60	42.80	47.00	52.90
22"	26.30	27.90	30.30	32.60	35.40	39.20	43.00	46.80	50.50	55.60	62.60
23"	28.30	30.00	32.50	35.20	38.30	42.40	46.50	50.70	54.70	60.20	67.80
24"	30.40	32.30	35.00	37.90	41.30	45.70	50.30	54.70	59.20	65.10	73.30
25"	32.50	34.50	37.50	40.60	44.20	49.00	53.80	58.70	63.50	69.90	78.90
28"	34.60	36.80	40.00	44.40	47.30	52.80	57.70	63.00	68.20	75.10	84.80
27"	36.60	38.90	42.30	46.00	50.10	55.70	61.40	67.00	72.50	80.00	90.30

CARBORUNDUM AND ALOXITE CLOTH DISCS

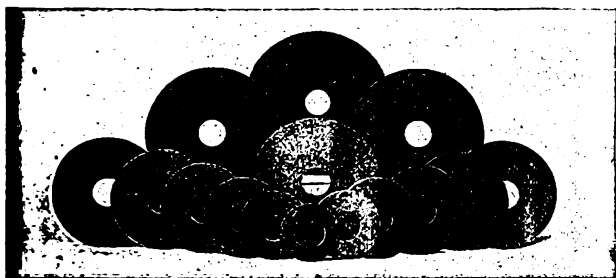
The successful operation of a disc grinding machine depends principally on the quality of the abrasive disc used.

The disc must possess the property of retaining a sharp cutting surface and the grains of abrasive material must be so coated on the disc that they will not pull off. The surface of the disc must not be filled with glue so that the grains are entirely embedded and a smooth surface produced, as in such a case the disc will soon become ineffective and useless.

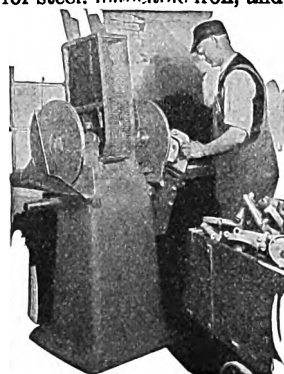
The Carborundum Company has developed Carborundum and Aloxite discs to such a high standard of quality that they are recognized among the best abrasive discs on the market.

Carborundum discs are recommended for brass and aluminum, and Aloxite discs for steel, malleable iron, and cast iron, although for some cast-iron work Carborundum discs have given wonderful results.

Carborundum and Aloxite discs are made both single and double coated in grits from 12 to 150 and in any size desired.



GROUP OF DISCS
FIG. 1034



BESLY DISC GRINDER
FIG. 1035

CARBORUNDUM AND ALOXITE CLOTH DISCS SINGLE COATED
MADE IN THE FOLLOWING GRITS:REGULAR WEIGHT MARKED "R"
LIST PRICE PER DISC

Dia. in Inches	90 & Finer	80	70	60	46	36	24	16	12	8
4	\$0.03	\$0.03	\$0.03	\$0.04	\$0.04	\$0.05	\$0.05	\$0.06	\$0.07	\$0.08
5	.05	.05	.05	.06	.06	.08	.08	.10	.11	.12
6	.06	.07	.07	.08	.08	.09	.11	.13	.15	.17
8	.10	.11	.11	.12	.14	.16	.19	.23	.27	.29
9	.13	.13	.14	.16	.17	.20	.24	.29	.33	.37
10	.17	.18	.19	.21	.23	.28	.31	.37	.43	.47
12	.22	.24	.25	.28	.30	.35	.42	.51	.59	.64
15	.32	.34	.36	.40	.45	.51	.62	.76	.90	.94
18	.51	.54	.57	.62	.69	.78	.95	1.16	1.36	1.48
20	.62	.65	.69	.77	.85	.96	1.16	1.42	1.67	1.81
23	.81	.85	.91	1.00	1.10	1.25	1.52	1.86	2.18	2.36
24	.89	.94	.99	1.10	1.21	1.38	1.66	2.03	2.38	2.58
26	1.03	1.08	1.15	1.27	1.40	1.60	1.93	2.36	2.77	3.00
30	1.38	1.45	1.54	1.70	1.87	2.14	2.58	3.16	3.70	4.02
36	1.97	2.07	2.20	2.43	2.68	3.06	3.69	4.52	5.29	5.74
40	2.45	2.58	2.74	3.03	3.34	3.82	4.61	5.64	6.61	7.17
48	3.45	3.63	3.86	4.25	4.70	5.36	6.47	7.91	9.27	10.05
53	4.30	4.52	4.80	5.28	5.85	6.68	8.07	9.87	11.57	12.55

CARBORUNDUM AND ALOXITE CLOTH DISCS

MADE IN THE FOLLOWING GRITS: DOUBLE COATED MARKED "DC"

LIST PRICE PER DISC

Dia. in Inches	90 & Finer	80	70	60	46	36	24	16	12	8
4	\$0.05	\$0.05	\$0.05	\$0.06	\$0.06	\$0.08	\$0.08	\$0.09	\$0.11	\$0.12
5	.08	.08	.08	.09	.09	.12	.12	.15	.17	.18
6	.09	.11	.11	.12	.12	.14	.17	.20	.23	.26
8	.15	.17	.17	.18	.21	.24	.29	.35	.41	.44
9	.20	.20	.21	.24	.26	.30	.36	.44	.50	.56
10	.26	.27	.29	.32	.35	.42	.47	.56	.65	.71
12	.33	.36	.38	.42	.45	.53	.63	.77	.89	.96
15	.48	.51	.54	.60	.68	.77	.93	1.14	1.35	1.41
18	.77	.81	.86	.93	1.04	1.17	1.43	1.74	2.04	2.22
20	.93	.98	1.04	1.16	1.28	1.44	1.74	2.13	2.51	2.72
23	1.22	1.28	1.37	1.50	1.65	1.88	2.28	2.79	3.27	3.54
24	1.34	1.41	1.49	1.65	1.82	2.07	2.49	3.05	3.57	3.87
26	1.55	1.62	1.73	1.91	2.10	2.40	2.90	3.54	4.16	4.50
30	2.07	2.18	2.31	2.55	2.81	3.21	3.87	4.74	5.55	6.03
36	2.96	3.11	3.30	3.65	4.02	4.59	5.54	6.78	7.94	8.61
40	3.68	3.87	4.11	4.55	5.01	5.73	6.92	8.46	9.92	10.76
48	5.18	5.45	5.79	6.38	7.05	8.04	9.71	11.87	13.91	15.08
53	6.45	6.78	7.20	7.92	8.78	10.02	12.11	14.81	17.36	18.88

SAND AND GARNET PAPER AND EMERY CLOTH**FLINT SAND PAPER
IN SHEETS 9 X 11 INCHES**

IN SHEETS 9 X 11 INCHES								
Nos.....	00	0	1½	1	1½	2	2½	3
Weight Per Ream, about, Lbs.....	16	18	20	26	30	40	46	55
Per Ream.....	\$7.50	\$7.50	\$7.95	\$9.00	\$10.50	\$12.15	\$13.95	\$15.90

Half Ream in a package

**GARNET PAPER
IN SHEETS 9 X 11 INCHES**

IN SHEETS 9 X 11 INCHES							
Nos.....	6/0-180	5/0-160	4/0-140	3/0-120	2/0-90	0-70	
Per Ream.....	\$11.00	\$11.00	\$11.00	\$11.00	\$11.00	\$11.00	
<hr/>							
Nos.....	1/2-60	1-50	1 1/2-40	2-36	2 1/2-30	3-24	3 1/2-20
Per Ream.....	\$12.70	\$15.00	\$17.50	\$20.40	\$23.60	\$26.30	\$29.60

Half Ream in a package.

**GARNET PAPER
IN 50 YARD ROLLS**

Width	4/0 to 0	½	1	1½	2	2½	3	3½
2½ inches.....	\$ 1.75	\$ 1.90	\$ 2.15	\$ 2.35	\$ 2.65	\$ 2.90	\$ 3.25	\$ 3.65
3 inches.....	2.05	2.25	2.50	2.80	3.10	3.45	3.80	4.35
3½ inches.....	2.30	2.55	2.85	3.20	3.55	3.95	4.40	5.00
4 inches.....	2.60	2.90	3.20	3.60	4.05	4.50	5.00	5.70
5 inches.....	3.20	3.55	3.95	4.45	4.95	5.55	6.15	7.05
6 inches.....	3.75	4.20	4.70	5.25	5.90	6.60	7.35	8.40
7 inches.....	4.35	4.80	5.40	6.10	6.85	7.65	8.50	9.75
8 inches.....	4.90	5.50	6.15	6.90	7.75	8.70	9.65	11.10
9 inches.....	5.50	6.10	6.85	7.75	8.70	9.75	10.80	12.40
10 inches.....	6.05	6.75	7.60	8.60	9.55	10.75	12.00	13.80
12 inches.....	7.20	8.05	9.05	10.25	11.50	12.85	14.35	16.50
14 inches.....	8.35	9.35	10.50	11.85	13.35	15.00	16.70	19.20
15 inches.....	8.95	10.00	11.25	12.70	14.30	16.05	17.90	20.55
16 inches.....	9.50	10.60	11.95	13.50	15.20	17.10	19.05	21.90
18 inches.....	10.65	11.90	13.40	15.20	17.10	19.15	21.40	24.60
20 inches.....	11.80	13.20	14.90	16.80	18.95	21.25	23.75	27.30
24 inches.....	13.00	14.60	16.50	18.70	21.10	23.70	26.50	30.50
26 inches.....	15.25	17.10	19.30	21.80	24.60	27.60	30.80	35.45
30 inches.....	16.25	18.25	20.60	23.35	26.35	29.65	33.15	38.15
31 inches.....	18.15	20.35	22.95	26.00	29.30	32.85	36.70	42.15
36 inches.....	19.50	21.90	24.75	28.10	31.70	35.60	39.80	45.75
40 inches.....	21.65	24.30	27.50	31.20	35.20	39.55	44.20	50.90
42 inches.....	22.75	25.55	28.85	32.70	36.95	41.50	46.40	53.40
44 inches.....	25.60	28.75	32.40	36.70	41.45	46.55	52.00	59.80
48 inches.....	26.00	29.20	33.00	37.40	42.20	47.40	53.00	61.00

Intermediate sizes at next higher list.

**EMERY CLOTH
IN SHEETS 9 X 11 INCHES**

Nos.....	Crocus or 000 to 0	½	1	1½	2	2½	3
Weight Per Ream, Lbs.....	25	45	50	54	60	64	70
Per Ream.....	\$30.00	\$31.20	\$32.75	\$34.30	\$36.50	\$39.40	\$42.50

Quarter Ream in a package

CARBORUNDUM RUBBING BRICKS AND STONES

Under the head of rubbing bricks and stones are manufactured a great variety of different standard or special shapes and sizes of stones for dressing and smoothing granite and marble, also for scouring castings, chilled iron, and steel rolls used in tin-plate mills, rolling mills, etc. These stones are not squared up and dressed but are packed as they come from the kilns. There is practically no limit to the possibility of manufacture in this line and while we list a few sizes most commonly used and carried in stock, we are prepared to furnish, when called upon, any size or shape in any grit, from the coarsest to the finest. We shall be pleased to quote special prices on any plain or irregular shapes. These stones are all made by the vitrified process, and can be used dry or with water or oil.



NO. 212—FIG. 1052

Number.....	211	212	214	215	222	223
Size, inches.....	8x2x2	8x2x1	6x2x2	6x2x1	4x2x2	4x2x1
Price, Each.....	\$1.05	.65	.90	.50	.65	.40

FOR CONCRETE WORK



FIG. 1054



FIG. 1055



FIG. 1056

The Carborundum Rubbing Bricks have been proven the most economical and the fastest cutting mediums known to the concrete trade for dressing down concrete surfaces, removing mould marks and cleaning forms and moulds. The round and rectangular fluted bricks are used for removing mould marks, surfacing and general work. The rectangular brick is fluted on two sides so as to give it a shear cut; the round brick has circular flutes. The special beveled edge slip stone is for smoothing out corners, coves, bases and out-of-the-way places in concrete work.

DRESSING DOWN CONCRETE SURFACES
FIG. 1051

RECTANGULAR FLUTED

Size, inches.....	8x3x3	8x2x2	6x2x2	4x2x2
Price, Each.....	\$2.40	1.05	.90	.65

ROUND FLUTED

4½ inches diameter, 2 inches thick. Price Each..... \$1.05

SLIP STONES

8 inches long, 4 inches wide, tapered from 1¾ to ½ inch.

Price Each..... \$1.20

ROLL SCOURING BLOCKS

Listed below are a few of the common sizes. A large variety of sizes in different grits, however, are carried in stock.

Number.....	239	241	242	249
Size in inches	4x2x1½	3¾x2¼x1½	5½x2¼x1½	9x3½x2
Price, Each..	2¼ \$0.80	2½ .80	2¾ 1.20	4 2.90
Number.....	253	254	256	261
Size in inches	4x1¾x1½	7x2¼x1½	5½x1¾x1½	5x1¾x1½
Price, Each	2¼ \$0.80	2½ 1.45	2½ 1.10	2 .90
Number.....	262	268	269	270
Size in inches	4x1½x1½	5½x1¾x1½	5x2x2	8x2x2
Price, Each	2½ \$0.80	2¼ .90	2¼ 1.10	2½ 1.70
Number.....	271	273		
Size in inches	5½x2¼x1½	7x5x2		
Price, Each	2¾ \$1.20	6¼x2¼ 3.60		

Roll scouring blocks are made for scouring and dressing chilled and steel rolls, used in tin plate mills, rolling mills, etc. These blocks are made in all grits.



VARIOUS SHAPES OF ROLL SCOURING BLOCKS

FIG. 1053

SHARPENING STONES—CARBORUNDUM AND ALOXITE

CARBORUNDUM AND ALOXITE SHARPENING STONES



FIG. 1036

POSITIVELY unequaled for rapid-cutting qualities. Used dry or with water or oil. Are quite porous, and may be tempered in their cutting by filling with wax or vaseline.

No.	Length Inches	Width Inches	Thick- ness Inches	Grade	Price Each
115	8	2	1	Fine	\$1.75
116	8	2	1	Medium	1.75
117	8	2	1	Coarse	1.75
118	8	2	3/4	Fine	1.50
119	8	2	3/4	Medium	1.50
120	8	2	3/4	Coarse	1.50
121	6	2	1	Fine	1.25
122	6	2	1	Medium	1.25
123	6	2	1	Coarse	1.25
124	6	2	5/8	Fine	1.00
125	6	2	5/8	Medium	1.00
126	6	2	5/8	Coarse	1.00
130	6	1 1/2	1 1/2	Fine	.75
131	6	1 1/2	1 1/2	Medium	.75
132	6	1 1/2	1 1/2	Coarse	.75
133	7	2	1	Fine	1.50
134	7	2	1	Medium	1.50
135	7	2	1	Coarse	1.50
136	5	2	5/8	Fine	1.00
137	5	2	5/8	Medium	1.00
138	5	2	5/8	Coarse	1.00
142	4	1 3/4	1 1/2	Fine	.75
143	4	1 3/4	1 1/2	Medium	.75
144	4	1 3/4	1 1/2	Coarse	.75

CARBORUNDUM ROUND COMBINATION BENCH STONE



FIG. 1038

This stone is made in the round form so as to allow for the circular motion used in sharpening chisels and similar tools.

It is made with one side coarse grit for taking out nicks and bringing the tool to an edge and the other side of a very fine grit for giving the keen finished edge.

No. 107—Combination Stone, 4 inches diameter, 1 inch thick, Price each..... \$2.00

Furnished in Aloxite in same size and price.

CARBORUNDUM AND ALOXITE COMBINATION STONES



FIG. 1037

Designed especially for carpenters and mechanics.

They are made with one face of coarse and one face of very fine grit. The coarse side can be used for sharpening very dull tools; the fine side for giving the required keen lasting edge.

No.	Size	Price Each
108	8 x 2 x 1 inches	\$2.25
109	6 x 2 x 1 "	1.75
110	7 x 2 x 1 "	2.00
111	5 x 2 x 3/4 "	1.35
112	4 x 1 3/4 x 5/8 "	1.00

SHIP BUILDERS CARBORUNDUM COMBINATION STONES

Size, 12 x 4 x 2 inches..... Price each \$6.00

CARBORUNDUM MACHINISTS' SPECIAL



FIG. 1039

This stone is especially designed for machinists' use. It is a fast-cutting stone and holds its shape perfectly. This stone is of just the proper grit and grade for sharpening lathe and planer tools, milling cutters, reamers and drills. Oil or water may be used with this stone.

No. 292—Carborundum Machinists' Special.

Size, 4 x 1 x 1 1/2 inches, FF grit, fine, Price each..... \$0.60

This stone is furnished in Aloxite in same size and price.

COMBINATION KNIFE STONES



FIG. 1041

Are designed especially for sharpening planer knives, paper and cloth cutting knives, without taking the blade from the machine. The groove protects the fingers. Made with one side fine grit and the other side coarse grit.

No. 289—Combination Stone, 4 inches diameter, 1 1/2 inches thick..... \$3.00

No. 332—Combination Knife Stone, 3 1/2 inches square, 1 1/2 inches thick..... 3.00



FIG. 1042

SHARPENING STONES—CARBORUNDUM AND ALOXITE

STONES FOR TRUING AND SHARPENING AUTOMATIC PLANER KNIVES



FIG. 1046

This Carborundum stone is used in connection with the truing and sharpening device with which woodworking machines are generally equipped, and keeps the knives in perfect condition. The sizes generally used are listed below. Special shapes or sizes can be furnished.

	Price Each
Carborundum Stone, 4 x $\frac{7}{8}$ x $\frac{1}{8}$ inches.....	\$0.55
Carborundum Stone, 4 x $\frac{3}{4}$ x $\frac{3}{4}$ inches.....	.55
Carborundum Stone, 3 x 1 x $\frac{1}{2}$ inches.....	.50
Carborundum Stone, 3 x 1 x $\frac{3}{4}$ inches.....	.55
Carborundum Stone, 2 $\frac{3}{4}$ x $\frac{3}{4}$ x $\frac{3}{4}$ inches.....	.50
Carborundum Stone, 1 $\frac{3}{4}$ x $\frac{3}{4}$ x $\frac{1}{2}$ inches.....	.45

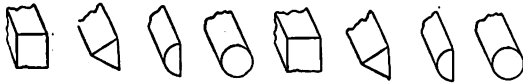
These stones are furnished in Aloxite in same sizes and prices.

CARBORUNDUM AND ALOXITE STICKS

Carborundum and Aloxite sticks are hard, sharp and fast cutting. They hold their shape and retain the cutting face and edge. Made in round, square, triangular, and half-round shapes for jewelers, die cutters, engravers and instrument makers; for mould and die cleaning. The sticks are made in three grits: fine, medium and coarse.



FIG. 1043

FIG. 1044
Price Each

Thickness	4 inches long				6 inches long			
	Square	Triangular	Half Round	Round	Square	Triangular	Half Round	Round
$\frac{1}{8}$	\$0.50	\$0.65	\$0.65	\$0.70	\$0.70	\$0.85	\$0.85	\$0.95
$\frac{1}{16}$	.50	.65	.65	.70	.70	.85	.85	.95
$\frac{1}{32}$	.50	.65	.65	.70	.70	.85	.85	.95
$\frac{1}{64}$	.55	.70	.70	.75	.75	.95	.95	1.00
$\frac{1}{128}$	.55	.70	.70	.75	.75	.95	.95	1.00
$\frac{1}{256}$	.60	.75	.75	.80	.85	1.00	1.00	1.05
$\frac{1}{512}$	...	...	...	...	.90	1.05	1.05	1.10
$\frac{1}{1024}$	...	...	...	...	.95	1.10	1.10	1.20



FIG. 1045

Thickness	8 inches long				10 inches long			
	Square	Triangular	Half Round	Round	Square	Triangular	Half Round	Round
$\frac{1}{8}$	\$1.00	\$1.20	\$1.20	\$1.40	\$1.35	\$1.50	\$1.50	\$1.60
$\frac{1}{16}$	1.10	1.30	1.30	1.45	1.40	1.50	1.50	1.60
$\frac{1}{32}$	1.10	1.30	1.30	1.45	1.40	1.50	1.50	1.60
$\frac{1}{64}$	1.20	1.40	1.40	1.50	1.45	1.65	1.65	1.70
$\frac{1}{128}$	1.30	1.45	1.45	1.55	1.55	1.70	1.70	1.75
$\frac{1}{256}$	1.40	1.50	1.50	1.60	1.65	1.80	1.80	1.80

IRON BOXES FOR CARBORUNDUM OR ALOXITE OIL STONES

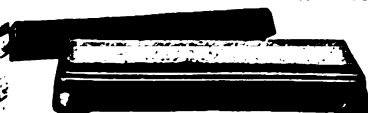


FIG. 1050

	Price Each
6x2x1 inches....	\$1.25
7x2x1 inches....	1.25
8x2x1 inches....	1.25

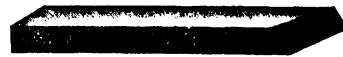


FIG. 1047

The S. A. Woods Machine Company equips its truing and sharpening devices with an Aloxite stone of a special bevel end shape, in medium fine grit. Aloxite is so hard, sharp, and tough that the stones keep the knives always keen and smooth cutting, show long life and never burn the steel.

Price Each

Aloxite stone for S. A. Woods Machine, 4x $\frac{3}{4}$ x $\frac{1}{8}$ inches... \$0.55

CARBORUNDUM SLIP STONES



FIG. 1040

These stones are made in five sizes and three different grits of each size. They cut rapidly and hold their shape perfectly.

No.	Length Inches	Width Inches	Thickness Inches	Grade	Price Each
174	6	2 $\frac{1}{4}$	$\frac{3}{4}$ - $\frac{3}{8}$	Fine	\$1.25
175	6	2 $\frac{1}{4}$	$\frac{3}{4}$ - $\frac{3}{8}$	Medium	1.25
176	6	2 $\frac{1}{4}$	$\frac{3}{4}$ - $\frac{3}{8}$	Coarse	1.25
177	4 $\frac{1}{2}$	1 $\frac{3}{4}$	$\frac{1}{4}$ - $\frac{1}{8}$	Fine	.75
178	4 $\frac{1}{2}$	1 $\frac{3}{4}$	$\frac{1}{4}$ - $\frac{1}{8}$	Medium	.75
179	4 $\frac{1}{2}$	1 $\frac{3}{4}$	$\frac{1}{4}$ - $\frac{1}{8}$	Coarse	.75
180	4 $\frac{1}{2}$	2 $\frac{1}{8}$	$\frac{5}{8}$ - $\frac{1}{4}$	Fine	1.00
181	4 $\frac{1}{2}$	2 $\frac{1}{8}$	$\frac{5}{8}$ - $\frac{1}{4}$	Medium	1.00
182	4 $\frac{1}{2}$	2 $\frac{1}{8}$	$\frac{5}{8}$ - $\frac{1}{4}$	Coarse	1.00
183	4 $\frac{1}{2}$	1 $\frac{3}{4}$	$\frac{1}{2}$ - $\frac{1}{8}$	Fine	.75
184	4 $\frac{1}{2}$	1 $\frac{3}{4}$	$\frac{1}{2}$ - $\frac{1}{8}$	Medium	.75
185	4 $\frac{1}{2}$	1 $\frac{3}{4}$	$\frac{1}{2}$ - $\frac{1}{8}$	Coarse	.75
186	4	1	$\frac{1}{4}$ - $\frac{1}{8}$	Fine	.65
187	4	1	$\frac{1}{4}$ - $\frac{1}{8}$	Medium	.65
189	4	1	$\frac{1}{4}$ - $\frac{1}{8}$	Coarse	.65

These stones are furnished in Aloxite in same sizes and prices.

WOOD BOXES

FOR CARBORUNDUM OR ALOXITE OIL STONES



FIG. 1048

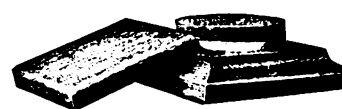


FIG. 1049

These Boxes are made of well-seasoned chestnut. The base is made with a shoulder so that the cover will fit down tight. Boxes are highly polished, have lock corners and are well made in every respect. Made in four sizes.

	Price Each
No. 1, for stones, 8x2x1 inches.....	\$0.60
No. 2, for stones, 6x2x1 inches.....	.60
No. 4, for stones, 7x2x1 inches.....	.60
No. 5, with round recess for stone No. 107..	1.25

POLISHING BUFFS



FIG. 966



FIG. 967

FELT POLISHING WHEELS

When properly made, felt wheels are adapted for practically all classes of buffing work. When set up with glue and emery they can be used for roughing out, grinding and polishing, or when used with crocus, rouge or polishing compounds, they can be used for obtaining the highest finish and for coloring. They can be furnished hard, soft or medium.

Dia. in.....	5	6	8	10	12	14
Thickness, in.....	1	1	1	1½	2	2½
Price per lb.....	\$4.00	\$4.00	\$4.00	\$4.00	\$4.00	\$4.00

UNBLEACHED MUSLIN BUFFING WHEELS 18-PLY TO EACH SECTION

A good grade of unbleached cloth suitable for cutting down or coloring up.

Dia. in.....	6	8	10	12	14	16
Each Section.....	\$0.40	.46	.65	.85	.95	...

SEWED UNBLEACHED MUSLIN BUFFING WHEELS 18-PLY TO EACH SECTION

These wheels are made up of whole discs of cloth stitched from center to edge; rows about ⅛-inch apart. Suitable for cutting down brass with tripoli, or can be set up.

Dia. in.....	8	10	12	14	16
Each Section.....	\$ ...	...	.75	.85	...

SEWED CANVAS POLISHING WHEELS

These wheels are made by cementing together a number of ½-inch sections and are designed to be somewhat harder than the ordinary sewed wheels.

Dia. in.....	8	8	10	10	10	12	12
Thickness, in.....	1½	2	1½	2	2½	2	2½
Each.....	\$2.50	\$3.50	\$3.50	\$4.40	\$5.60	\$6.80	\$7.75

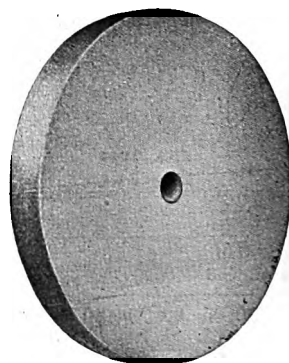


FIG. 968

PLATING AND POLISHING SUPPLIES

TRIPOLI COMPOSITION—REX BRAND

Tripoli composition for cutting down and polishing brass, bronze, Britannia and other metals preparatory to plating. Fast cutting; cake form.

No. 1 Grade—for general work.....	Per Pound	\$0.20
No. 2 Grade—for heavy work and cutting down aluminum.....		.20
Barrel Lots of about 425 lbs.....		.....

HARD RED ROUGE—REX BRAND

An excellent polishing compound, for nickel coloring and where high finish is desired. Cake form.

No. 1 Grade—for silver, nickel, etc.....	Per Pound	\$0.25
No. 2 Grade—for brass, bronze, etc.....		.25
Barrel lots of about 400 lbs.....		.....

WHITE COLORING COMPOSITION—REX BRAND

No. 1 Final finish copper, aluminum, etc.....	Per Pound	\$0.20
No. 2 For one wheel work, cut down and color, one operation.....		.20

CROCUS COMPOSITION—REX BRAND

Largely used for producing smooth finished surfaces of Cast Iron or Steel. Dry and extra sharp.

Brick form.....	Per Pound	\$0.25
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REX BRAND EMERY CAKE

Emery Cake, Grits: FF to 100 grit.....	Per Pound	\$0.20
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REX BRAND GREASE STICK

Grease in form of sticks for wheel lubrication, only...	Per Pound	\$0.25
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REX BRAND SPECIAL GLUE—FOR BUFFS

In rectangular cakes.....	Per Pound	\$0.50
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Abrasive Grains
Aloxite & Carborundum Grains
Buffing and Grinding Heads
Carborundum & Aloxite Wheels

} See index.

"ECONOMY" STEEL WIRE WHEEL BRUSHES

"ECONOMY" Wire Wheel Brushes are operated on an ordinary Emery Grinder. The wire used is made from a specially prepared high grade steel, and drawn for use in these Wheel Brushes. The treatment to which it is subjected before being put into the Brushes causes it to stand out stiff, presenting a uniformly sharp, scratching surface; and wear down evenly, without crystallizing, bending, or breaking. This is an immense advantage both in long life and in efficiency.

Where employed on plain, smooth surfaces, they should be run at somewhat higher speed.

Operators should be instructed not to use too much pressure in applying the work to the Brush. If run at proper speed, the wire will stand out stiff, presenting a sharp, scratching surface and the Brush will give better results and last much longer where the work is applied moderately.

To insure best results and longest service, "Economy" Wire Wheel Brushes, when used on figured castings, should be speeded as given.



ONE "ECONOMY" SECTION
FIG. 970

ECONOMY WHEEL BRUSHES COMPLETE, INCLUDING METAL HUB

No. Brush	Diam. of Brush Inches	Width of Face Inches	Diam. of Hub Inches	Bearing on Shaft Inches	Approx. Weight Lbs.	List Each	Revolutions Per Minute
50C	15	2½	6¼	2⅞	16	\$39.00	1200 to 1600
53C	12	2	5	2⅜	9½	28.00	1500 to 1800
54C	10	1¾	5	2⅜	8¾	27.00	1800 to 2100
55C	8	1½	4	2	4½	20.60	2100 to 2400
56C	7	1¼	3	1⅞	3	18.20	2400 to 2600
57C	6	1½	3	1⅞	2¾	15.40	2600 to 2800

STEEL WIRE SECTIONS ONLY FOR ECONOMY WHEEL BRUSHES

Section No.	Wire No.	Sections Per Set	List Per Set
3314	33	6	\$15.00
3411	34	5	12.00
358	35	5	11.00
364	36	4	8.60
373	37	4	7.20
392	39	4	6.40

When ordering, state size of arbor hole required.
No. 50C regularly made for arbors 2 inches diameter and smaller.
Nos. 53C and 54C for arbors 1¼ inches diameter and smaller.

Nos. 55C, 56C, and 57C for arbors 1 inch diameter and smaller.
For larger sized arbors, there will be a slight additional cost.

BRASS WIRE SECTIONS FOR "ECONOMY" WHEEL BRUSHES

No.	Diameter Sections Inches	Sections Per Set	Size of Wire Decimals of an Inch	For Hub No.	List Per Set
Y1744 Brass.....	12	5	.010	53C and 155	\$15.00
Y1332 Brass.....	10	5	.010	54C and 155	14.00
Y 916 Brass.....	8	4	.010	55C and 144	9.60
S 712 Brass.....	7	4	.0075	56C and 134	8.00
S 510 Brass.....	6	4	.0075	57C and 134	7.20

FIG. 971

WIRE GAUGES

To avoid confusion, when referring to special sizes of wire, please specify in addition to the gauge number which one of the several common "Standard Gauges" you refer to.

The Standard Table for steel wire is the Washburn and Moen Gauge.

POWER TIRE ROUGHING BRUSHES

Wire Wheel Brushes afford the quickest and most effective method of ripping off old rubber and roughing treads on automobile tires preparatory to vulcanizing. The Brushes listed below are made on metal hubs, which are practically indestructible and which can be used indefinitely. The wire part is made of sections which, when worn out, can readily be replaced by the operator.

The use of Wire Wheel Brushes on rubber is very severe and unless brushes of high quality and substantial construction are used, much difficulty will be experienced.

These Brushes are also suitable for many other kinds of work, such as removing rust from automobile rims, buffing beads, tread bands and tubes in rubber tire factories, etc.

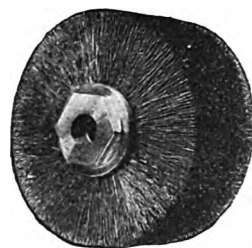


FIG. 972

COMPLETE BRUSH

No.	Diam. of Hub Inches	Bearing on Shaft Inches	Width of Face Inches	For Sect. No.	Diameter of Sections Inches	List Each
5259 Brass...	2	4	3	301¾	5	\$22.60
5260 Brass...	2	4	3	361¾	5	23.70
5263 Brass...	2½	4	3	302	6½	24.35
5261 Brass...	2½	4	3	362	6½	25.00
55C Steel...	4	2	1½	364	8	15.50
54C Steel...	5	2⅞	1¾	358	10	20.25

SECTIONS OR REFILLS HIGH CARBON STEEL WIRE

No.	Sections Per Set	Wire No.	List Each
301¾	11	30	\$0.55
361¾	11	36	.70
302	11	30	.75
362	11	36	.85
364	4	36	1.60
358	5	35	1.65

When ordering Hubs, always be sure to specify the diameter of arbor hole required.

WIRE GAUGES

To avoid confusion when referring to special sizes of wire, please specify in addition to the gauge number which one of the several common "Standard Gauges" you refer to. The standard table for steel wire is the Washburn and Moen Gauge.

BRUSHES

CASTING

SOLID BLOCKS

Made of first quality, Tempered Flat Steel Wire on well finished solid hardwood blocks; strong and durable, and will withstand the severest use.

.017x.059 Tempered Flat Steel Wire—5 Wires Doubled per Hole.

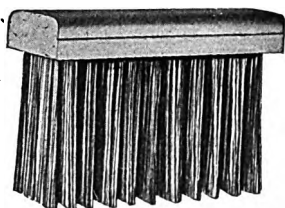


FIG. 973

No.	Rows	Length of Wire, inches	Block inches	Price Each
1	4x10	2	7 $\frac{3}{4}$ x2 $\frac{1}{4}$	\$0.40
2	4x10	3	7 $\frac{3}{4}$ x2 $\frac{1}{4}$	.45
3	4x10	4	7 $\frac{3}{4}$ x2 $\frac{1}{4}$	.55
4	4x10	5	7 $\frac{3}{4}$ x2 $\frac{1}{4}$	.60
5	5x10	2	7 $\frac{3}{4}$ x2 $\frac{5}{8}$	.55
5 $\frac{1}{2}$	5x10	2 $\frac{1}{2}$	7 $\frac{3}{4}$ x2 $\frac{5}{8}$	.60
6	5x10	3	7 $\frac{3}{4}$ x2 $\frac{5}{8}$	.65
7	5x10	4	7 $\frac{3}{4}$ x2 $\frac{5}{8}$	.70
8	5x10	5	7 $\frac{3}{4}$ x2 $\frac{5}{8}$	.75
9	5x10	6	7 $\frac{3}{4}$ x2 $\frac{5}{8}$	.85

CURVED BACK WIRE SCRATCH

SOLID BLOCKS

The curved face of these Brushes increases their efficiency, as it gives greater leverage than is possible with the ordinary straight or flat face Brushes.

Curved Back Brushes are made of Tempered Fine Round Steel Wire and are especially designed for removing paint, varnish and wax from hardwood floors, and for cleaning and preparing flat varnished or painted surfaces for refinishing.

The No. 1775 is particularly recommended for use on floors in connection with paint and varnish removing preparations.

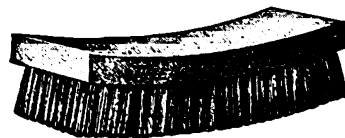


FIG. 974

No.		Price Each
1779	Block 7x3 inches, 9x21 rows, length of wire 1 $\frac{1}{4}$ inches.....	\$1.00
1775	Block 7x3 inches, 9x21 rows, length of wire 1 $\frac{1}{4}$ inches, finer wire than No. 1779, heavily filled.	1.20

CURVED HANDLE SCRATCH



FIG. 975

Fine Round Steel Wire Brushes will be found very effective for cleaning grease, dirt, old paint, etc., from various parts of vehicles of all kinds. They are especially desirable for use in connection with the overhauling or cleaning and repairing of a car.

Curved Handle Brushes will be found especially suited for architectural iron work, figured brass and finished castings.

They are largely used for patternmakers' and braziers' work also as file cleaning brushes. They will be found very effective for getting into corners and out-of-the-way places inaccessible to the ordinary hand scratch brush.

SOLID BLOCKS

No.		Price Each
1807	2 rows, length of wire 1 inch, block 14x1 $\frac{1}{2}$ inches, length of brush part 6 inches.....	\$0.40
1777	3 rows, length of wire 1 $\frac{1}{2}$ inches, block 14x1 $\frac{1}{2}$ inches, length of brush part 6 inches.....	.50
0188	4 rows, length of wire 1 $\frac{1}{4}$ inches, block 14x1 $\frac{1}{2}$ inches, length of brush part, 6 inches.....	.60

SPARK PLUG

This is an excellent Wire and Bristle Brush for cleaning spark plugs. The stiff wires are for cleaning off carbon, grease, etc., and the bristle tuft at the end for cleaning the finer parts. Each brush is equipped with two thin flat steels for cleaning out parts of the plug ordinarily inaccessible.

No. 89 Tinned Steel Wire, price each \$0.30



FIG. 976

CHAIN OR GEAR

These Brushes were especially designed for cleaning chain and gears of automobiles, motorcycles, bicycles, etc.

No.		Price Each
285	1 row, Black China Bristle, length of bristle $\frac{1}{8}$ inch	\$0.20
286	2 row, Black China Bristle, length of bristle $\frac{1}{8}$ inch	.30
287	3 row, Black China Bristle, length of bristle $\frac{1}{8}$ inch	.40



FIG. 977

BRUSH FOR GENERAL SHOP USE



FIG. 978

Good, practical Bench or Dusting Brushes for general shop purposes at moderate prices. They are especially suited for use about lathes and for brushing filings, borings, chips, etc., from machine tools.

GREY TAMPICO FACTORY DUSTERS

Solid Natural Finished Handles, Staple Set

No.	Inches		
399	10	Length of fibre $2\frac{3}{4}$ inches, Price each	\$0.55

COUNTER OR BENCH DUSTERS

These Brushes will be found unusually serviceable for general dusting purposes. For many uses they are superior to the dusters with fiared ends as stock is more compact on the face of brushing surface.

GREY TAMPICO FIBRE

Solid Block Stained Red, Staple Set

No.	Inches		Price each
77	7	Length of fibre 2 inches	\$0.35
78	8	Length of fibre 2 inches	.45

PURE BLACK HAIR

Solid Natural Polished Handles, Staple Set

No.	Inches		Price each
55	7	Length of hair $2\frac{1}{4}$ inches	\$0.85
56	8	Length of hair $2\frac{1}{4}$ inches	.95
57	9	Length of hair $2\frac{1}{4}$ inches	1.05

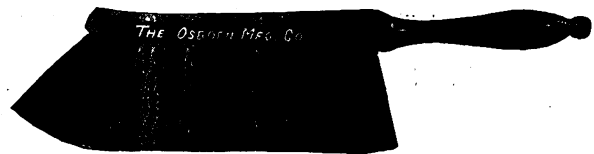


FIG. 979

PURE BLACK HORSE HAIR

Solid Natural Polished Handles, Staple Set

No.	Inches		Price each
580	7	Length of hair $2\frac{1}{2}$ inches	\$1.35
581	8	Length of hair $2\frac{1}{2}$ inches	1.50
582	9	Length of hair $2\frac{1}{2}$ inches	1.55

PURE BLACK CHINA BRISTLE

Solid Red Polished Handles, Set with Cement

No.	Inches		Price each
392	8	Length of bristle $2\frac{1}{8}$ inches	\$2.00
393	9	Length of bristle $2\frac{1}{8}$ inches	2.35
394	10	Length of bristle $2\frac{1}{8}$ inches	2.65

FLOOR BROOMS



FIG. 980

PALMYRA FIBRE

Solid Natural Varnished Blocks, Two Tapered Handle Holes, Polished Handles, Staple Set, Oval Face

No.	Inches		Price each
640	14	Length of fibre 4 inches	\$2.80
641	16	Length of fibre 4 inches	3.15
642	18	Length of fibre 4 inches	3.50
643	20	Length of fibre 4 inches	3.85
645	24	Length of fibre 4 inches	4.15
646	30	Length of fibre 4 inches	5.10

These Brooms are made of a stiff fibre and are heavily filled. They are adapted for heavy sweeping on floors such as will generally be found in factories, warehouses, garages, stores, etc. These are good brooms for sweeping cement or stone sidewalks.

GRINDING WHEEL DRESSERS

COLLMER PATTERN

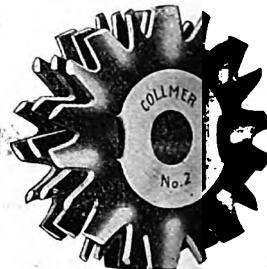


STYLE NO. 1—FIG. 4031



FIG. 4060

These are highly efficient tools. They are fitted with a knurled bushing in the handle in place of the ordinary turned bushing as used in most of the other dressers. The objectionable features of the bushing constantly loosening is thus practically eliminated in these Dressers and consequently the user does not have to keep continually "tightening up."



STYLE NO. 2—FIG. 4032

DRESSERS

No. 1—This dresser will take either No. 1 or No. 2 Collmer Cutters. It has knurled bushing in the handle instead of the ordinary turned bushing used in other dressers. Price, each.....\$0.75

No. 3—This dresser will take either No. 3 or No. 4 Collmer Cutters and is used for truing emery wheels over 16 inches in diameter. Price, each.....\$1.50

CUTTERS

Styles Nos. 1 and 2 are made as a unit. Cut fast and last long. Will fit any Huntington Handle. Danger of breakage is minimized when using these cutters. No. 1 Cutter is especially adapted for smooth grinding; No. 2 for rough grinding. No. 1 is used by marble manufacturers for their special grinding, and others. When using the No. 2 Cutter it will make a corrugation by pressing hard. This is a feature that is not known to be accomplished by any other type of cutter on the market.

Nos. 1 and 2. Price per set.....\$0.25

Nos. 3 and 4. Price per set.....\$0.25

No. 3—Same as No. 2 except that diameter is 2 1/4 inches, width 1/2 inch, bore 3/8 inch.

No. 4—Same as No. 1 but dimensions are like No. 3.

No. 3 should be used for truing up large size emery wheels for rough grinding, and the No. 4 for truing up large size emery wheels for smooth grinding.

HUNTINGTON'S PATTERN

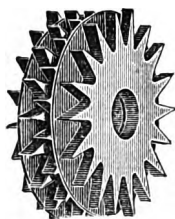
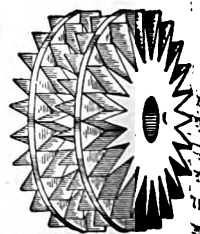
REGULAR
FIG. 4033

FIG. 4061

Complete with two sets of cutters, in box. Price, each.....\$1.50

Regular Cutters for above, 1 1/8 inch dia., width 1/2 inch, bore 1/4 inch
Price per set......20

Extra Long Tooth Cutters for above, 1 1/4 inch dia., width 1/2 inch, bore 1/4 inch. Price per set......30

EXTRA LONG TOOTH
FIG. 4034

SHERMAN PATTERN

Each Cutter having a different corrugation which prevents them from nesting and gives it a different cutting edge. The cutters always remain sharp, as the corrugated face remains the same until worn down almost to the spindle, thus giving far greater cutting surface to the dresser than is possibly obtainable with the notched cutter. The washers between which these cutters revolve prevent the sides of the handle from wearing.

No. 1.....	Each
Cutters, 3 in set, 1 1/2 inches in diameter.....	\$1.50
No. 2.....	.15
Cutters, 4 in set, 2 3/8 inches in diameter.....	2.00
	.25



FIG. 1070

THE CARBORUNDUM STICK

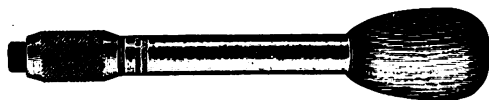


FIG. 1069

Consists of a steel tube holding a stick of Carborundum 1/2 inch in diameter and 6 in. long. Stick can be fed out by turning collet nut. For dressing and truing grinding wheels of all kinds.

No.	
55	Complete with one stick.....
56	Extra sticks 6x1/2 in.....

GRINDING WHEEL DRESSERS

DIAMOND PATTERN

HAND TURNING DIAMOND WHEEL DRESSER



FIG. 1071

7-16 IN. X 6 IN. X 11¼ IN. OVER ALL

DIAMOND TOOL
FOR NORTON GRINDERS

FIG. 1072

7-16 IN. X 7-8 LONG

DIAMOND TOOL
FOR LANDIS GRINDERS

FIG. 1073

1-4 IN. SHANK X 1 IN. OVER ALL

SIZES NOS. 12 TO 20 INCLUSIVE

These sizes are most suitable for hand tools in connection with Universal Cutter and Tool Grinder work, small wheels of electrical grinders and similar wheels of not over 12 in. to 14 in. in diameter.

SIZES NOS. 22 TO 30 INCLUSIVE

These sizes are mostly used on the medium size grinding machines of Landis, Norton, Cincinnati, and other grinders of similar type carrying wheels up to 24 in. in diameter.

SIZES NOS. 32 TO 40 INCLUSIVE

These sizes are generally used where the diamond is subject to very severe service, such as extra large machines carrying large and coarse grit wheels.

In ordering Plain Bar Holders, specify diameter and length of bar desired.

Charge for resetting diamonds, \$1.00 each.

All tools furnished with Improved Method of solid setting unless special setting is requested.

Prices of Carbon (black diamond) and unmounted stones furnished upon request.

Price list applies to Landis, Norton, Plain Bar, Hand Tools, etc. In ordering, please specify number and kind of holder wanted.

Number . . .	12	14	16	18	20	22	24	
Price, each .	\$6.00	7.20	9.00	10.20	12.00	15.00	18.00	
Number . . .	26	28	30	32	34	36	38	40
Price, each .	\$21.60	24.00	30.00	36.00	42.00	48.00	54.00	60.00

METCALF PATTERN

will turn a bevel or "V" edge or true up a square edge on a grinding wheel quickly and effectively.

prevents chipping or breaking away of the grinding wheel.

will turn a very sharp edge.

is superior to a diamond dresser for many purposes and far less expensive.

will supplement the work of a diamond dresser on large coarse snagging wheels, when a smooth-grinding surface is desired.

adaptation for use on all kinds of wheels as used for an infinite variety of purposes in all industries is remarkable.

is well adapted for surface and cylindrical grinding wheels.

ice Each \$7.00

tra Wheels Each 2.00



FIG. 1074

FILE CARD



NO. 2—FIG. 1119

Varnished Hardwood Back and Handle, Hardened Steel Wire Brush attached to leather face, with cleaner.

4¾ x 1½-inch face, Length overall 10 inches. Weight per dozen about 4 pounds. Price, each \$0.75

FILE CARD AND BRUSH



NO. 4—FIG. 1120

Varnished Hardwood Back and Handle, Hardened Steel Wire Brush attached to leather on one side, bristle brush inserted in frame on other side, with cleaner.

4¾ x 1½-inch face, Length overall 10 inches. Weight per dozen about 5 pounds. Price, each \$1.00

FILE HANDLES COMMON

PLAIN FINISH—STEEL FERRULES



FIG. 1122

No.	Size	Size Ferrule inch	Price per dozen
1	4½ x 1-inch	½	\$0.35
2	4¾ x 1½-inch	5/8	.40
3	5 x 1¾-inch	¾	.45
4	5½ x 1½-inch	7/8	.55

BEAT-EM-ALL

GUARANTEED NOT TO SPLIT. FERRULES CANNOT BE LOST. FILES REMAIN RIGID IN HANDLE

Sizes		Price per dozen
No. 1	for 3—6 inch files.....	\$1.00
No. 2	for 6—8 inch files.....	1.15
No. 3	for 8—12 inch files.....	1.25
No. 4	for 12—18 inch files.....	1.35

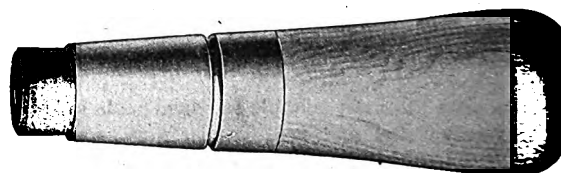


FIG. 1121

SKROO-ZON

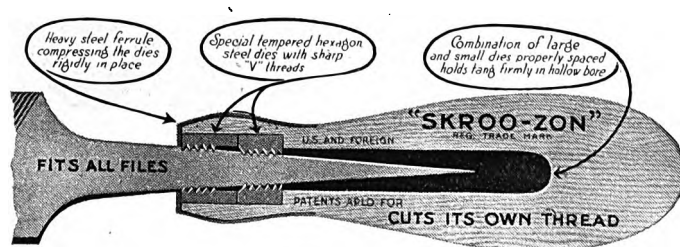


FIG. 4035

The wood used is selected, moisture absorbing hard wood, carefully filed to the least degree. The tang being held firmly in the hollow bore of the handle never engages the wood which, being relieved of strain, cannot split.

Made in nine sizes fitting every size and style of file made from the smallest 2-inch files up to the largest.

No.	For Files, Inches	Price Per Dozen	No.	For Files, Inches	Price Per Dozen	No.	For Files, Inches	Price Per Dozen
1	2	\$4.80	4	8	\$5.40	7	14	\$6.60
2	4	4.80	5	10	5.40	8	16	6.60
3	6	5.40	6	12	6.00	*9	..	6.00

*Long Saw Filer's Special.

Use No. 1 and No. 2 for special small files for die-makers, dentists, opticians, jewelers, etc.

Use No. 6 for Bearing Scrapers.

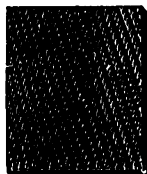
Use No. 7 and No. 8 for soldering irons.

CUT OF FILES

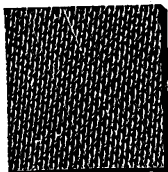
ILLUSTRATIONS SHOWING THE DIFFERENT "CUTS" IN GENERAL USE FOR TWELVE INCH FILES.
ON FILES LARGER THAN 12 INCH THE CUT IS MADE PROPORTIONATELY COARSER, AND FINER ON SHORTER LENGTHS.

DOUBLE CUT

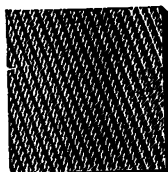
ESPECIALLY ADAPTED FOR USE IN MACHINE SHOPS, LOCOMOTIVE WORKS, FOUNDRIES AND SIMILAR CLASSES OF WORK.



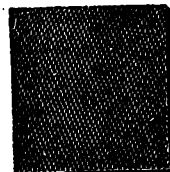
COARSE—FIG. 1077



BASTARD—FIG. 1078



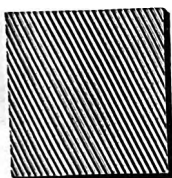
SECOND CUT—FIG. 1079



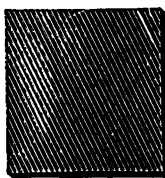
SMOOTH—FIG. 1080

SINGLE CUT

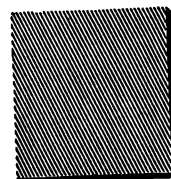
PARTICULARLY ADAPTED FOR SAW FILING, ALSO USED ON LATHE WORK BY MACHINISTS, AND BY SOME CLASSES OF WOOD WORKERS, CARRIAGE BUILDERS, ETC.



BASTARD—FIG. 1081



SECOND CUT—FIG. 1082



SMOOTH—FIG. 1083

GENERAL DESCRIPTION OF FILES AND RASPS

FILES AND RASPS HAVE THREE DISTINGUISHING FEATURES

First—Their Length—Which is always measured exclusive of their Tang.

Second—Their Kind or Name—Which has reference to the shape or style.

Third—Their Cut—Which has reference not only to character, but also to relative degrees of coarseness of Teeth.

The Length—Of a File is the distance between its Heel or part of the File where the Tang begins and the point or end opposite. The Tang or portion of the File prepared for the reception of the Handle is never included in the Length. In general, the Lengths of Files bear no fixed proportion to either their Width or Thickness, even though they be of the same kind.

The Kind—By Kind is meant the varied shapes or styles of Files which are distinguished by certain technical names, as, for instance, Flat, Mill, Half-Round, etc. The Kinds are divided, from the form of their Cross Sections into Three Geometrical Classes, namely, Quadrangular Sections, Circular Sections, and Triangular Sections; Odd and Irregular Forms are collected under Miscellaneous Classes. These Classes are in turn sub-divided according to their general outline, into Taper and Blunt.

Taper—Designates a file, the Point of which is more or less reduced in size, both in Width and Thickness by a gradually narrowing Section extending from One-half to Two-thirds the length of the File, from the point.

Blunt—Designates a File that preserves its Sectional Shape throughout, from Point to Tang.

The Cut of Files is divided, with reference to the character of the Teeth, into Single Cut, Double Cut and Rasp Cut, and with reference to the Coarseness of the Teeth into Rough, Coarse, Bastard, Second Cut, Smooth and Dead Smooth. Regarding the latter we may say very briefly that the Coarse and Bastard Cuts are used upon the coarser, heavier classes of work, while the Second Cut and Smooth are used for the finer grades and for finishing the work started by the Coarse and Bastard. The Rough and Dead Smooth are seldom called for, but correspond to the above use.

The Single Cut File—Is one in which a Single, Unbroken Course of Chisel Cuts is made across its Surface, arranged parallel to each other, but with a horizontal obliquity to the Central Line.

The Double Cut File—Has Two Courses of Chisel Cuts crossing each other, the Second Course, with rare exceptions, being finer than the first.

Rasp Cut—Differs from Single or Double Cut in the respect that the Teeth are disconnected from each other, each Tooth being made by a single pointed punch.

Safe Edge, or Side—Terms used to denote that a File has one or more of its Edges or Sides Smooth or Uncut, that it may be presented to the work without injury to that portion which does not require to be Filed.

CELEBRATED BARTON AND SMITH FILES

Barton and Smith files are manufactured in the regular grades of cut, viz: Rough, coarse, bastard, second-cut, smooth and dead smooth and are universally known. These files are forged from the highest grade crucible steel. Have no equal for toughness and temper and satisfaction in using. All are carefully tested and selected and are fully guaranteed.

SECTIONAL VIEW OF FILES

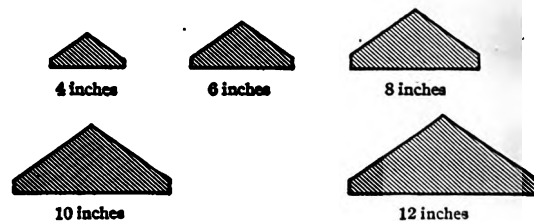
THREE SQUARE AND REGULAR TAPER SAW



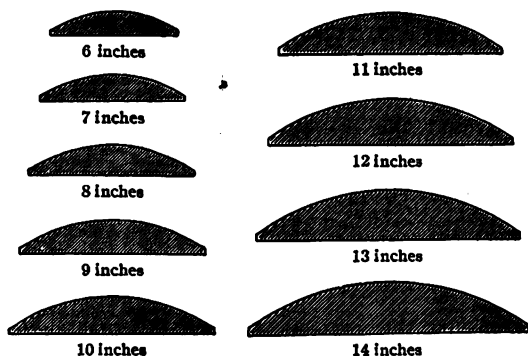
SLIM TAPER SAW



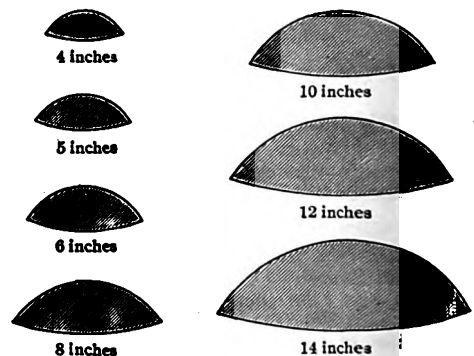
Cant Saw



Cabinet



Crossing



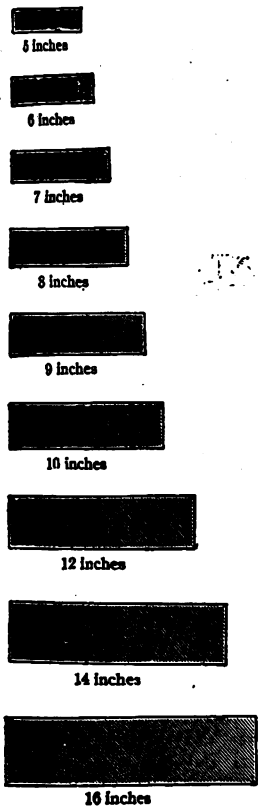
Cross-Cut



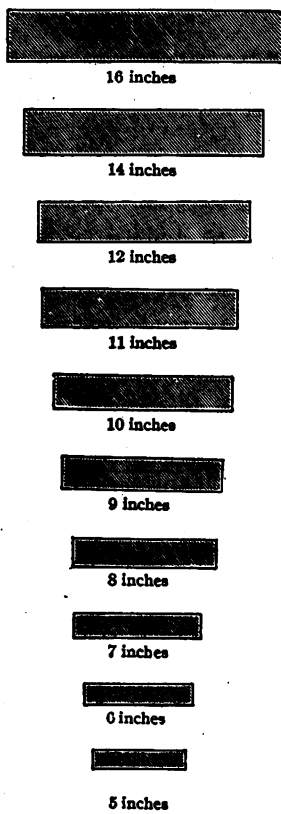
FIG. 1075

SECTIONAL VIEW OF FILES

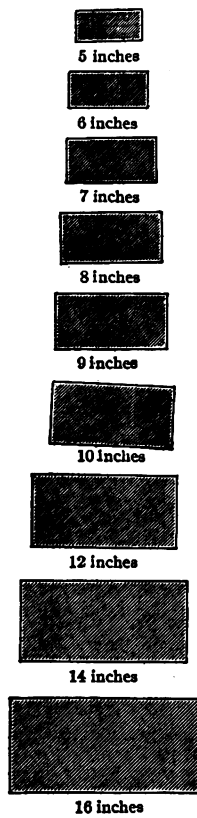
Flat



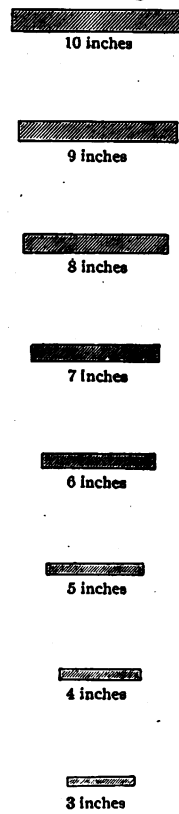
Mill



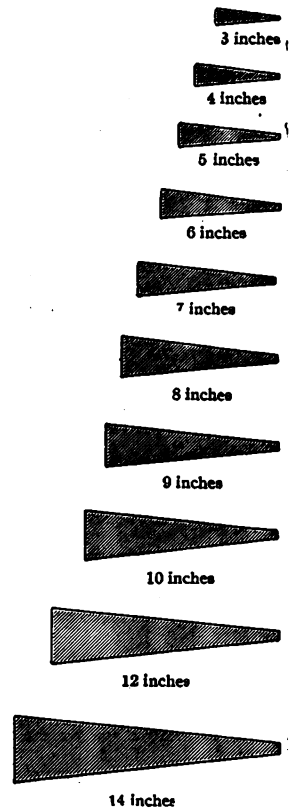
Pillar



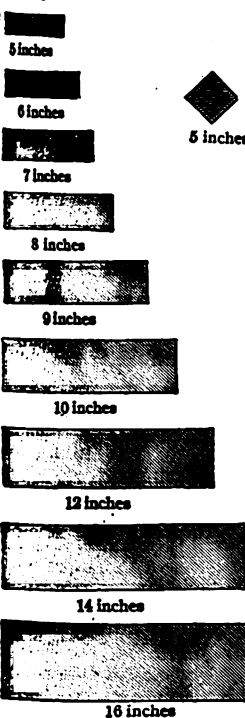
Warding



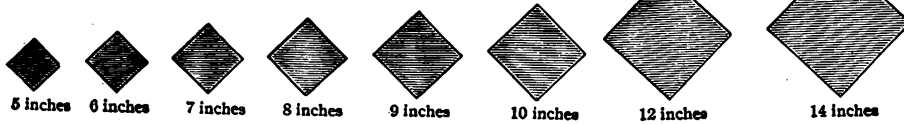
Knife



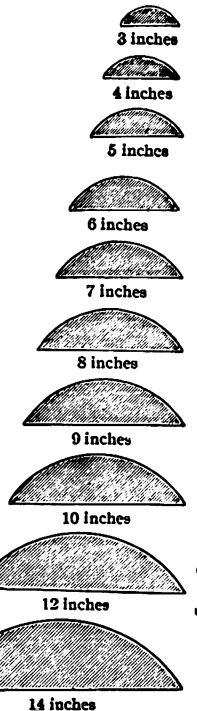
Hand



Square



Half-Round



Pit Saw



Hooked Tooth



Round

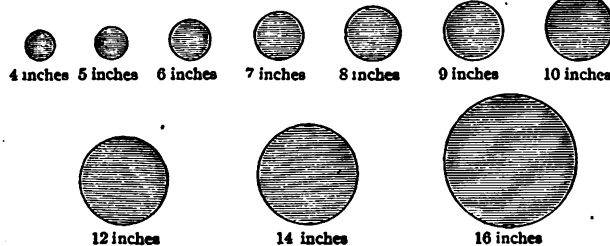


FIG. 1076

PRICE LIST OF FILES AND RASPS

List of Nov. 1, 1899. As adopted by the File Manufacturers Association of the United States, Nov. 1, 1899. Price per dozen
(Revised and reprinted January 1, 1919.)

Inch	Mill			Mill 1 R. E.		Mill 2 R. E.		Mill Blunt		Inch	Tapers		Hand-saw Blunt	Slim Taper	Extra Slim Taper	Taper Heavy	Bandsaw Blunt & Taper		Pitsaw	Inch
	Bast.	2d Cut	Smooth	Bast.	2d Cut	Bast.	2d Cut	Bast.	2d Cut		Sgl. Cut	Dbl. Cut					Reg.	Slim		
3	3.00									3	2.10	2.50		2.10		2.10				3
3 1/4										3 1/4	2.10	2.50		2.10		2.10				3 1/4
4	3.00									4	2.20	2.90	2.60	2.20	2.20	2.20	2.90		4.80	4
4 1/4										4 1/4	2.40	3.10	3.00	2.30	2.30	2.40	3.10		5.40	4 1/4
5	3.20									5	2.60	3.50	3.40	2.50	2.50	2.60	3.50		5.40	5
5 1/4										5 1/4	3.00			2.90	2.90	3.00			6.10	5 1/4
6	3.50	4.00	4.50	3.90	4.50	4.40	5.00	3.90	4.60	6	3.40	4.70	4.30	3.10	3.10	3.40	4.70	3.90	6.10	6
7	3.90	4.60	4.90	4.40	5.20	4.90	5.80	4.30	4.90	7	4.30	5.60	5.40	3.80	3.80	4.30	5.60		6.10	7
8	4.30	4.90	5.40	4.80	5.50	5.40	6.10	4.90	5.80	8	5.40	6.70	6.60	4.50	4.50	5.40	6.70	5.30	7.50	8
9	4.90	5.80	6.30	5.50	6.50	6.10	7.30	5.60	6.40	9										9
10	5.60	6.40	7.00	6.30	7.20	7.00	8.00	6.70	7.80	10	8.10			6.40		8.10				10
12	7.60	8.60	9.40	8.40	9.70	9.40	10.80	9.40	10.70	12	12.50			9.50						12
14	10.70	12.20	13.10	12.00	13.70	13.40	15.30			14										14
16	14.70	16.80	17.90							16										16
18	20.20									18										18

Inch	Flat			Hand			Square			Inch	Three Square			Half Round			Round			Inch
	Bast.	2d Cut	Smooth	Bast.	2d Cut	Smooth	Bast.	2d Cut	Smooth		Bast.	2d Cut	Smooth	Bast.	2d Cut	Smooth	Bast.	2d Cut	Smooth	
3 & 4	3.70	4.30	4.70	3.70	4.30	4.80	3.80	4.60	4.90	3 & 4	4.80	5.60	6.10	4.80	5.60	6.10	3.00	3.50	3.90	4
5	3.90	4.60	4.90	3.90	4.70	5.30	4.10	4.80	5.30	5	5.40	6.10	6.40	5.40	6.10	6.40	3.20	3.80	4.10	5
6	4.30	4.80	5.30	4.30	5.10	5.60	4.60	5.10	5.50	6	6.10	6.70	7.10	6.10	6.70	7.10	3.50	4.00	4.50	6
7	4.80	5.50	6.10	4.90	5.80	6.30	5.10	5.80	6.30	7	7.00	7.70	8.20	7.00	7.70	8.20	3.90	4.60	4.90	7
8	5.30	6.10	6.60	5.40	6.30	6.70	5.50	6.30	7.00	8	7.50	8.30	8.90	7.50	8.30	8.90	4.30	4.90	5.40	8
9	6.30	7.20	7.90	6.70	7.80	8.30				9							4.90	5.80	6.30	9
10	7.00	8.10	8.70	7.50	8.70	9.40	7.40	8.50	9.10	10	9.10	10.10	10.70	9.10	10.10	10.70	5.60	6.40	7.00	10
11	8.60									11										11
12	9.70	11.00	12.10	10.70	12.30	13.50	10.20	11.50	12.80	12	11.80	13.00	13.90	11.80	13.00	13.90	7.50	8.60	9.40	12
13	11.80									13										13
14	13.30	15.30	16.70	15.00	17.00	18.20	13.90	16.10	17.50	14	15.50	17.00	18.30	15.50	17.00	18.30	10.70	12.20	13.10	14
16	17.80	20.10	22.30	20.10	22.80	24.20	18.70	21.20	23.30	16	20.60	22.50	24.20	20.60	22.50	24.20	14.70	16.80	17.90	16
18	23.90	26.80	29.20	26.80	29.90	31.60	25.10	28.20	30.40	18	27.50	29.90	32.00	27.50	29.90	32.00	20.20	22.70	24.30	18
20	31.50	35.30	38.30	35.10	39.20	41.60	32.80	36.70	39.30	20	36.20	39.40	42.30	36.20	39.40	42.30	27.40	30.70	32.90	20

Inch	Pillar			Warding			Knife			Inch	Square Blunt Bast.	Round Blunt Bast.	Hand Finishing		Flat Dead Smooth	Hand Dead Smooth	Half Rd. Dead Smooth	Lead Float and Wood Files		Inch
	Bast.	2d Cut	Smooth	Bast.	2d Cut	Smooth	Bast.	2d Cut	Smooth				2d Cut	Smooth				Flat	Hf.Rd.	
3 & 4				4.00	4.80	5.40	5.40	6.10	6.40	4										4
5				4.50	5.30	5.80	6.10	6.70	7.10	5										5
6	4.30	5.10	5.60	4.90	5.90	6.40	6.90	7.50	7.90	6	5.50							4.80	7.00	6
8	5.40	6.30	6.70	6.40	7.50	8.20	8.50	9.10	9.50	8	7.40	5.60	7.80	8.30	10.60	10.80	15.00	6.30	8.50	8
10	7.50	8.70	9.40	8.70	10.10	11.00	10.10	11.50	12.30	10	10.20	7.50	10.90	11.80	14.00	15.00	18.20	8.60	10.70	10
12	10.70	12.30	13.50				13.70	15.20	16.10	12	13.90	10.70	15.20	16.20	19.40	21.40	23.60	11.80	14.10	12
14	15.00	17.00	18.20							14	18.70	14.70	20.60	21.70	26.60	30.00	31.00	16.00	18.50	14
16	20.10	22.80	24.20							16	25.10							21.50	24.70	16
18										18	32.80									18

Inch	Double Ender	Cant Saw	Cross Cut	Hook Tooth	Planer Knife	Cabinet Files	Cabinet Rasps		Flat Single Cut Coarse and Bast.	Inch	Flat Open Cut			Half Round Open Cut			Half Rd. Wood Rasps			Inch
							2d Cut	Smooth			Bast.	2d Cut	Smooth	Bast.	2d Cut	Smooth	Bast.	2d Cut	Smooth	
6		5.40				8.10	10.10	11.70		6							8.10	9.30	10.10	6
7	3.50								6.30	7										7
8	3.90	6.40	7.50	8.30	6.40	10.10	12.80	15.50		8	6.30	7.20	7.90	8.50	9.40	9.90	10.10	12.20	13.70	8
9	4.40									9										9
10	4.90	8.70	9.10	10.10	8.60	13.70	17.50	20.70	8.60	10	8.60	9.80	10.70	10.70	11.80	12.70	13.70	16.80	18.70	10
12						18.70	22.80	26.80	11.80	12	11.80	13.60	14.70	14.10	15.40	16.60	18.70	22.40	24.80	12
14						24.80	29.60	33.90	16.00	14	16.00	18.30	20.00	18.50	20.40	21.70	24.80	29.70	32.90	14
16										16							32.90	38.90	43.60	16

Inch	Flatwood Rasps		Horse Rasps Plain			Horse Rasps Plain Slim				Inch	Horse Rasps				Shoe Rasps		Inch
	Bast.	2d Cut	½ File	¼ File	Reverse			¼ File	¼ File		Tanged	Tanged Slim		Tanged Thin	Flat	Hf. Rd.	
8	9.40	11.40								8					10.10	10.10	8
9										9					12.20	12.20	9
10	12.80	15.50								10					13.70	13.70	10
12	17.50	20.90	12.80	14.40						12	16.80			1.531"x.270"	16.00		12
13										13	19.60			1.594"x.275"	18.20		13
14	23.20	27.80	17.80	20.10	17.80					14	23.10	14"from13"stock	21.90	1.750"x.280"	21.90		14
15			20.90	23.60	20.90					15	27.30	15"from13"stock	25.20	1.812"x.285"	25.20		15
16	30.80	36.20	24.40	27.60	24.40	16" from 14" stock	21.50	24.60		16	32.20	16"from14"stock	29.70	1.875"x.290"	29.70		16
18			32.90	36.20		18" from 15" stock	25.90	28.50		18							18
20						20" from 16" stock	32.90			20							20

The above list comprises all of the kinds, sizes and cuts of files that will be regularly carried in stock. Anything differing from these files will be considered as special and will not be manufactured except in case of urgent necessity and when manufactured price will be based strictly upon cost of material and cost of manufacture at time goods are made.

BARTON AND SMITH FILES**FLAT BASTARD****FIG. 1084**

Length.....inches	4	5	6	7	8	9	10	11	12	13	14	16	18	20
Price.....per dozen	\$3.70	3.90	4.30	4.80	5.30	6.30	7.00	8.60	9.70	11.80	13.30	17.80	23.90	31.50

FLAT SECOND CUT

Length.....inches	4	5	6	7	8	9	10	12	14	16	18	20
Price.....per dozen	\$4.30	4.60	4.80	5.50	6.10	7.20	8.10	11.00	15.30	20.10	26.80	35.30

FLAT SMOOTH

Length.....inches	4	5	6	7	8	9	10	12	14	16	18	20
Price.....per dozen	\$4.70	4.90	5.30	6.10	6.60	7.90	8.70	12.10	16.70	22.30	29.20	38.30

HAND BASTARD, ONE SAFE EDGE**FIG. 1085**

Length.....inches	4	5	6	7	8	9	10	12	14	16	18	20
Price.....per dozen	\$3.70	3.90	4.30	4.90	5.40	6.70	7.50	10.70	15.00	20.10	26.80	35.10

HAND SECOND CUT, ONE SAFE EDGE

Length.....inches	4	5	6	7	8	9	10	12	14	16	18	20
Price.....per dozen	\$4.30	4.70	5.10	5.80	6.30	7.80	8.70	12.30	17.00	22.80	29.90	39.20

HAND SMOOTH, ONE SAFE EDGE

Length.....inches	4	5	6	7	8	9	10	12	14	16	18	20
Price.....per dozen	\$4.80	5.30	5.60	6.30	6.70	8.30	9.40	13.50	18.20	24.20	31.50	41.60

MILL BASTARD**FIG. 1091**

Length.....inches	4	5	6	7	8	9	10	12	14	16	18
Price.....per dozen	\$3.00	3.20	3.50	3.90	4.30	4.90	5.60	7.50	10.70	14.70	20.20

MILL, SECOND CUT

Length.....inches	6	7	8	9	10	12	14	16
Price.....per dozen	\$4.00	4.60	4.90	5.80	6.40	8.60	12.20	16.80

MILL, SMOOTH

Length.....inches	6	7	8	9	10	12	14	16
Price.....per dozen	\$4.50	4.90	5.40	6.30	7.00	9.40	13.10	17.90

MILL BASTARD, ONE ROUND EDGE

Length.....inches	6	7	8	9	10	12	14
Price.....per dozen	\$3.90	4.40	4.80	5.50	6.30	8.40	12.00

BARTON AND SMITH FILES

SQUARE BASTARD



FIG. 1086

Length.....inches	4	5	6	7	8	10	12	14	16	18	20
Price.....per dozen	\$3.80	4.10	4.60	5.10	5.50	7.40	10.20	13.90	18.70	25.10	32.80

WARDING



FIG. 1092

	BASTARD						SECOND CUT						SMOOTH				
Length.....inches	4	5	6	8	10		4	5	6	8	10		4	5	6	8	10
Price.....per dozen	\$4.00	4.50	4.90	6.40	8.70		4.80	5.30	5.90	7.50	10.10		5.40	5.80	6.40	8.20	11.00

KNIFE



FIG. 1093

	BASTARD						SECOND CUT						SMOOTH					
Length.....inches	4	5	6	8	10	12	4	5	6	8	10	12	4	5	6	8	10	12
Price.....per dozen	\$5.40	6.10	6.90	8.50	10.10	13.70	6.10	6.70	7.50	9.10	11.50	15.20	6.40	7.10	7.90	9.50	12.30	16.10

EXTRA SLIM TAPER



FIG. 1087

Length.....inches	4	4½	5	5½	6	7	8
Price.....per dozen	\$2.20	2.30	2.50	2.90	3.10	3.80	4.50

SLIM TAPER

Length.....inches	3	3½	4	4½	5	5½	6	7	8	10	12
Price.....per dozen	\$2.10	2.10	2.20	2.30	2.50	2.90	3.10	3.80	4.50	6.40	9.50

REGULAR TAPER



FIG. 1088

Length.....inches	3	3½	4	4½	5	5½	6	7	8	10	12
Price, Single Cut.....per dozen	\$2.10	2.10	2.20	2.40	2.60	3.00	3.40	4.30	5.40	8.10	12.50
" Double Cut....."	\$2.50	2.50	2.90	3.10	3.50	....	4.70	5.60	6.70	....	....

CANT SAW



FIG. 1089

BAND SAW, BLUNT, SINGLE CUT



FIG. 1090

						REGULAR						SLIM		
Length.....	inches	6	8	10	4	4½	5	6	7	8	3½	6	8	
Price.....	per dozen	\$5.40	6.40	8.70	2.90	3.10	3.50	4.70	5.60	6.70	2.50	3.90	5.30	

BARTON AND SMITH FILES**HALF ROUND BASTARD**

FIG. 1094

Length.....inches	4	5	6	7	8	10	12	14	16
Price.....per dozen	\$4.80	5.40	6.10	7.00	7.50	9.10	11.80	15.50	20.60

HALF ROUND, SECOND CUT

Length.....inches	4	5	6	7	8	10	12	14	16
Price.....per dozen	\$5.60	6.10	6.70	7.70	8.30	10.10	13.00	17.00	22.50

HALF ROUND, SMOOTH

Length.....inches	4	5	6	7	8	10	12	14	16	18	20
Price.....per dozen	\$6.10	6.40	7.10	8.20	8.90	10.70	13.90	18.30	24.20	32.00	42.30

ROUND BASTARD

FIG. 1095

Length.....inches	4	5	6	7	8	9	10	12	14	16	18	20
Price.....per dozen	\$3.00	3.20	3.50	3.90	4.30	4.90	5.60	7.50	10.70	14.70	20.20	27.40

ROUND, SECOND CUT

Length.....inches	4	5	6	7	8	9	10	12	14	16	18	20
Price.....per dozen	\$3.50	3.80	4.00	4.60	4.90	5.80	6.40	8.60	12.20	16.80	22.70	30.70

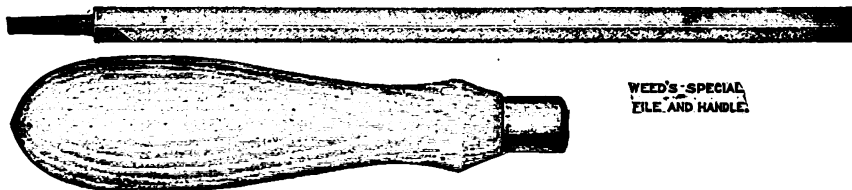
WEED SPECIALWEED'S SPECIAL
FILE AND HANDLE

FIG. 1096

Made from best English Crucible Steel. The shape is extra slim and has more teeth to the inch and sharper edges than other Taper Files. Especially adapted for Panel and all Fine Tooth Saws, because a Clean Gullet and a smooth, even Tooth is obtained. Four Brass Ferruled handles furnished with each dozen files.

Length.....inches	3½	4	4½	5	5½	6
Price.....per dozen	\$2.10	2.20	2.30	2.50	2.90	3.10

EXTRA (XF) FINE SWISS PATTERN FILES

X. F. is a term given to a brand of files, and signifies Extra Fine. In general it applies to all Swiss Pattern files, or that class of files used by jewelers, watch and tool makers and for similar fine work in which the best material and superior workmanship are required.

THREE SQUARE

FIG. 1109

Length, inches. Per Dozen.

Cut No.	3	4	6	8
00-0.....	\$2.75	\$2.75	\$3.25	\$4.35
2.....	2.95	2.95	3.50	4.70
4.....	3.25	3.25	3.95	5.30
6.....	3.75	3.75	4.55	6.10

METAL SAW

FIG. 1106

Length, inches. Per Dozen.

Cut No.	3	3½	4	6
0.....	\$2.75	\$2.75	\$2.75	\$3.25
2.....	2.95	2.95	2.95	3.50
4.....	3.25	3.25	3.25	3.95

KNIFE

FIG. 1104

Length, inches. Per Dozen.

Cut No.	3	4	6	8
00-0.....	\$2.80	\$3.00	\$3.95	\$5.60
2.....	3.00	3.40	4.70	6.60
4.....	3.40	4.00	5.80	8.25
6.....	4.00	4.90	7.30	11.10

WARDING

FIG. 1110

Length, inches. Per Dozen.

Cut No.	3	4	6	8
0-0.....	\$1.95	\$2.25	\$3.20	\$4.45
2.....	2.00	2.55	3.75	5.15
4.....	2.30	2.90	4.35	6.20
6.....	2.65	3.40	5.20	7.40

HALF ROUND

FIG. 1101

Length, inches. Per Dozen.

Cut No.	3	4	6	8	10
0-0.....	\$3.20	\$3.65	\$4.85	\$6.75	\$9.35
2.....	3.60	4.30	5.80	7.80	10.35
4.....	4.20	4.90	6.65	9.00	11.80
6.....	5.25	6.30	8.70	11.10	13.80

The cut is designated by numbers ranging from No. 00, the coarsest, to No. 6, the finest. While for many kinds of work the Barton Smith Files are all that are required, for more particular purposes Swiss Pattern Files are demanded.

CROSSING

FIG. 1102

Length, inches. Per Dozen.

Cut No.	3	4	6	8	10
00-0.....	\$3.80	\$4.05	\$5.40	\$7.80	\$10.50
2.....	4.15	4.50	6.10	8.60	11.65
4.....	4.70	5.25	7.10	9.70	13.00
6.....	5.55	6.30	8.85	11.90	15.50

SQUARE

FIG. 1107

Length, inches. Per Dozen.

Cut No.	3	4	6	8	10
00-0.....	\$2.45	\$2.55	\$3.20	\$3.95	\$5.00
2.....	2.50	2.70	3.60	4.75	6.10
4.....	2.60	3.15	4.55	6.15	8.00
6.....	2.70	3.40	5.30	7.60	10.00

ROUND

FIG. 1108

Length, inches. Per Dozen.

Cut No.	3	4	6	8	10
00-0.....	\$1.80	\$1.95	\$2.80	\$4.00	\$5.30
2.....	1.90	2.10	3.05	4.30	5.95
4.....	2.05	2.30	3.30	4.60	6.70
6.....	2.30	2.60	3.55	5.00	7.75

CROCHET

FIG. 1105

Length, inches. Per Dozen.

Cut No.	4	6	8
00-0.....	\$4.30	\$6.00	\$7.95
2.....	4.60	6.40	8.45
4.....	5.00	6.85	9.00

ROUND STRAIGHT

FIG. 1103

Length, inches. Per Dozen.

Cut No.	4	6	8
0.....	\$1.80	\$3.00	\$4.80
2.....	2.00	3.40	5.30
4.....	2.20	3.80	5.80

EQUALING

FIG. 1111

Length, inches. Per Dozen.

Cut No.	4	6	8
00-0.....	\$2.35	\$2.80	\$3.75
2.....	2.60	3.20	4.30
4.....	2.95	3.85	5.25
6.....	3.55	4.70	6.40

VIXEN FILES

The curved teeth of a Vixen File is the principal reason for its superior cutting capacity. These teeth act upon metal with a shearing effect. They produce automatically the diagonal motion which is the most effective for any cutting tool, from a razor to a saw. The curve has another advantage, incidental but none the less important to the working efficiency of the files. This is its success in "shedding" filings, however greasy the material, keeping the teeth clean and avoiding the frequent delays involved in the clogging of ordinary files.



FIG. 4039

FLAT

Flat files are tapered slightly in thickness and are parallel in width. The most commonly used file for all kinds of work.

UTILITY

This file by reason of the combination of cuts, regular on one side and smooth on the other, is a valuable addition to the equipment of every automobile, motor boat, mechanics' kit, and the household tool chest. The coarse cut side should be used for wood, lead, solder and all soft metal, and the smooth cut side for hard metals, such as iron, steel, bronze, etc. Made in flat style only.

FLEXIBLE



FIG. 4040

The Vixen is the only file made in the flexible style. The blade is cut on both sides and when in use is attached to a "back" to give it the proper rigidity. Made in all lengths and cuts.



FIG. 4041

The back may be straight or bent before the blade is attached, thereby giving the convexity necessary on many classes of work. Used extensively on automobile bodies and all sheet metal work.

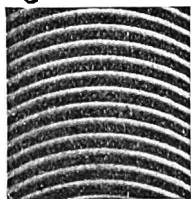
BABBITT

Fills the demand for a coarser cut file for use on Babbitt metal, solder, aluminum, wood, etc. Has 8 teeth per inch. Made in 12 and 14 inch lengths, flat style only.

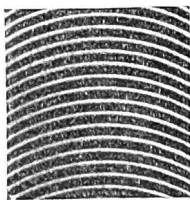
PILLAR

Made in 8, 10, 12 and 14 inch sizes, and used on narrow work and metal or wood patterns.

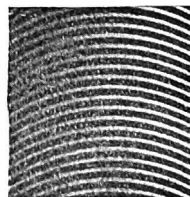
CUTS OF FILES



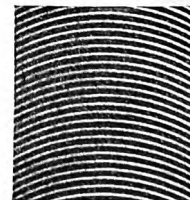
REGULAR, FIG. 1115.



FINE, FIG. 1116.



SMOOTH, FIG. 1117.



DEAD SMOOTH, FIG. 1118.

USE THE VIXEN MADE ESPECIALLY FOR YOUR WORK

Regular Cut: For Aluminum, all Soft Metals, Brass, Cast Iron, Copper, Soft Steel, Fibre, Marble, Rubber, Slate and Wood.
 Fine Cut: For Cast Iron, Phosphor Bronze, Steel, all Hard Metals and White Brass.
 Smooth Cut: For Superior Finish, and Lathe Work.
 Dead Smooth Cut: For Die and Tool Work; Finishing Hard Metal.

VIXEN FILES



FIG. 4042

SPECIFICATIONS

Table showing approximate width and thickness of Vixen Files; also number of teeth per inch in the various cuts.

Length	Flat		Flexible		Flat, Flexible Half Round				Pillar		Teeth Per Inch			
	Width	Thickness	Width	Thickness	Teeth Per Inch				Width	Thickness	Teeth Per Inch			
					Regular	Fine	Smooth	D.Smooth			Regular	Fine	Smooth	D.Smooth
8	$\frac{3}{4}$	$\frac{1}{8}$	$\frac{1}{2}$	$\frac{1}{8}$	14	16	18	20	$\frac{3}{16}$	$\frac{1}{4}$	18	20	22	24
10	1	$\frac{1}{8}$	1	$\frac{1}{8}$	12	14	18	20	$\frac{1}{16}$	$\frac{5}{16}$	16	18	20	22
12	$\frac{1}{4}$	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{3}{8}$	10	14	16	20	$\frac{1}{16}$	$\frac{3}{8}$	14	16	18	20
14	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{3}{4}$	$\frac{1}{2}$	9	12	15	18	$\frac{1}{16}$	$\frac{1}{2}$	14	16	18	20
16	$\frac{3}{4}$	$\frac{3}{4}$	$\frac{1}{2}$	$\frac{3}{4}$	9	12	15	18						
18	$1\frac{1}{8}$	$\frac{3}{4}$	$1\frac{1}{4}$	$\frac{3}{4}$	9	12	15	18						

In ordering be sure to state the length, shape or style, and cut of files wanted. All orders filled with flat style unless otherwise specified.

PRICE LIST OF VIXEN FILES

PRICE PER DOZEN

ADOPTED SEPTEMBER 1, 1917

Description	Flat, Pillar and Flexible*						Half Round					
Size—Inches	8	10	12	14	16	18	8	10	12	14	16	18
Regular.....	\$10.50	\$13.10	\$15.80	\$18.90	\$22.60	\$27.30	\$ 8.50	\$10.50	\$12.90	\$15.60	\$18.80	\$23.00
File.....	12.60	15.20	17.90	21.00	24.70	29.40	10.00	12.00	14.40	17.10	20.30	24.50
Smooth.....	13.70	16.30	18.90	22.00	25.70	30.40	10.80	12.80	15.20	17.90	21.10	25.30
Lead Smooth.....	14.70	18.40	22.00	26.20	29.90	34.60	11.80	14.80	18.20	21.90	25.10	29.30
Utility.....	12.00	14.70	17.30	20.50	24.00	.....	.....	.....	.....	.....	.....	.....
Abbott.....	.....	.....	19.40	21.50	.....	.....	.....	.....	.....	.....	.....	.....
Resharpener.....	1.10	1.30	1.60	1.90	2.30	2.70	1.10	1.30	1.60	1.90	2.30	2.70
Keys.....	6.00	6.50	7.00	7.50	8.00	8.50	.....	.....	.....	.....	.....	.....
Bolts and Nuts per dozen sets.....	2.00	2.00	2.00	2.50	2.50	2.50	2.00	2.00	2.00	2.50	2.50	2.50
1 bolts—2 nuts in one set)												

*Flexible files are cut on both sides and must be attached to a back when in use.
One back given with each dozen flexible files—of a size.

FILES

MAGNETO



FIG. 1097

A special file made for Automobile work. Thin narrow blade with round tang. Made of uniform thickness, handle attached and beveled point. Keeps clean all spark plugs, spark gaps, magnetos, ignition coils and contact points. Length blade $3\frac{1}{2}$ inches, full length, 6 inches. Price per dozen in Box or on Card..... \$3.00

MIDGET MAGNETO

An indispensable item of motor equipment. Keeps clean all magnetos, ignition coils, spark plugs, spark gaps, contacts, etc. Length blade $2\frac{1}{4}$ inches, full length $3\frac{1}{2}$ inches.

Price, per dozen..... \$1.80



FIG. 4036

CARBORUNDUM

The Carborundum File No. 59, is made to do the general shop work of the ordinary steel file, but has the advantage of doing better and quicker work, and in addition can be used for touching up case-hardened parts and removing scale from metals that cannot be touched by the steel file.

The Carborundum File No. 57 is so shaped that it can be used with good result in sharpening mower sections, scythes, spades, and other farm implements. The handiest abrasive tool that can be added to an



FIG. 4037

No. 53—18 inches long, wood handle. Price, each..... \$1.50
No. 57—13 inches long, wood handle. Price, each..... .75
No. 59—13 inches long, wood handle. Price, each..... .75

RASPS

CABINET



FIG. 1099

Length, inches.....	6	8	10	12	14
Second cut. Price, per dozen.....	\$10.10	12.80	17.50	22.80	29.60
Smooth. Price, per dozen.....	11.70	15.50	20.70	26.80	33.90

FLAT WOOD



FIG. 1100

Length, inches.....	8	10	12	14	16
Bastard. Price, per dozen.....	\$ 9.40	12.80	17.50	23.20	30.40
Second cut. Price, per dozen.....	11.40	15.50	20.90	27.80	36.50

HALF ROUND WOOD

Length, inches.....	6	8	10	12	14	16
Bastard. Price, per dozen.....	\$ 8.10	10.10	13.70	18.70	24.80	32.10
Second cut. Price, per dozen.....	9.30	12.20	16.80	22.40	29.70	38.10
Smooth. Price, per dozen.....	10.10	13.70	18.70	24.80	32.90	43.10

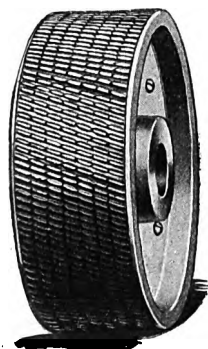
QUICK-KUT ROTARY
FOR TIRE RETREADING, ETC.

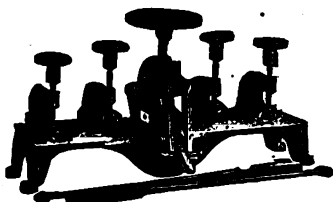
FIG. 4038

Removing the tread by the ordinary method is the most tedious and expensive part of retreading and is not done well at its best. Surprising results are obtained with the Quick-Kut Rotary Rasps. They quickly cut away the old tread and rough up the carcass ready for the next operation. Five to eight times can be prepared for the new tread in the same time that it requires to prepare one the old way. The illustration shows the solid steel style. They are very durable, and made of hardened steel. They may be re-cut should the cutting edge ever wear down. Solid steel rasp is 6 inches diameter, 2 inches face; size hole 1 and $1\frac{1}{4}$ inch. State size wanted. Speed 1500 to 1800. Price, each..... \$14.00

The National Steel Band Rotary Rasps have cast aluminum hubs. These are most satisfactory because they are exceptionally light, weighing only $3\frac{3}{4}$ pounds, thus avoiding vibration which may ruin bearings when running at high speed, and will balance better with an emery wheel or wire brush mounted on the same arbor or stand. The rasp band is held by two cast aluminum hubs. These hubs are secured fastened together by three bolts which can be taken apart instantly if desired. The steel band can be renewed should the cutting edge become worn. The hub will last an age. National rasp is 6 $\frac{1}{2}$ inches diameter, 2 inches face; size of hole 1 and $1\frac{1}{4}$ inch. State size hole wanted.

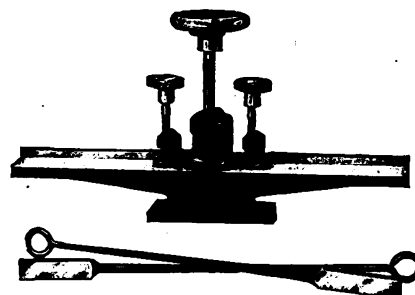
Rasp Band and Hub complete. Price..... \$14.00
Steel Rasp Band only. Price..... 12.00

BRAZING CLAMPS



NOS. 19 & 20—FIG. 1123

No. 89, 3-Inch Brazing Clamp with irons.....	Approx. Wt. lbs.	Price
No. 403, 4-Inch Brazing Clamp, complete with irons.....	100	\$33.00
No. 19, 6-Inch Brazing Clamp, complete with irons.....	150	44.00
No. 20, 8-Inch Brazing Clamp, complete with irons.....	285	51.35
		66.00



NO. 89—FIG. 1124

BRAZING TONGS

For 2-Inch Saws..... \$5.15

For 3, 4 or 5-inch Saws at \$1.50 per inch, but a Brazing Clamp is preferable.



FIG. 1125

FITTING-UP WHEELS FOR SCROLL BAND SAWS

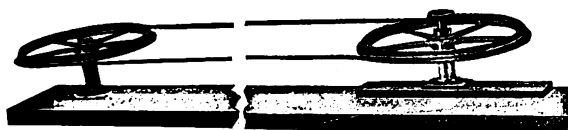


FIG. 1126

The band saw wheels here illustrated are faced with leather, and when mounted in position for use, one is stationary and the other adjustable.

	Approx. Wt. lbs.	Price
No. 88 Pair 18-Inch Wheels.....	60	\$29.35

BAND SAW FILING VISE

Suitable only for saws from $\frac{1}{8}$ to $2\frac{1}{2}$ inches. Clamps instantly and perfectly. Price very low for the size, weight and efficiency of the tool.

Approx. Wt. lbs. Price

No. 87A, 20-Inch Steel Jawed Band Saw Filing Vise.....	70	\$33.00
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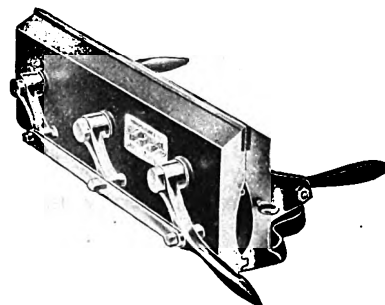


FIG. 1127

HAND CIRCULAR SAW SETS

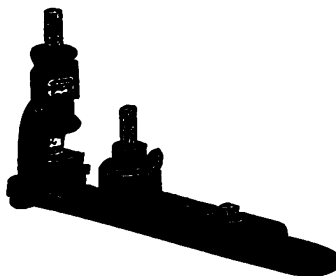
These Saw Sets have all been largely sold and have always proven satisfactory.

One cone only is furnished with each style at the price, suitable for usual requirements. Extra large cones can be furnished.

When ordering please give range in diameter of arbor holes and outlines of teeth in use.

Approx. Wt. lbs. Price

No. 105B, Circular Saw Set, for saws up to 30-inch dia.....	20	\$18.35
No. 105C, Circular Saw Set, for saws up to 48-inch dia.....	46	26.50



NO. 105B—FIG. 1128

HAND CIRCULAR SAW SETS

Saw Sets in styles 105A, 106 and 106A are equipped with a setting hammer mounted on a spring, so that the angle of the blow on saw is uniform. The force of the blow struck by the setting hammer on saw tooth depends on the weight of the hammer and the muscular power used. A machinist's hammer is commonly employed for all sets illustrated, but is not furnished by us except on special order at extra price according to weight.

With each order for Saw Set give size of largest and smallest arbor holes and rubbing on paper showing outlines of teeth, to enable us to meet the special requirements.

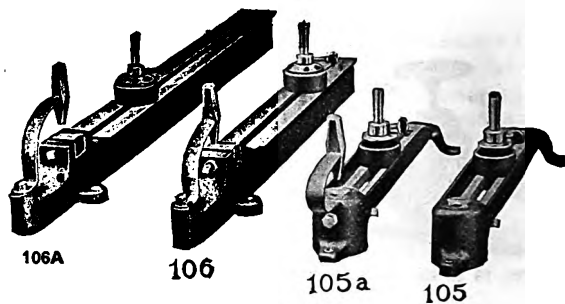


FIG. 1129

	Approx. Wt. lbs.	Price
No. 105, Circular Saw Set, for saws up to 30-inch dia.	37	\$16.45
No. 105A, Circular Saw Set, with Spring Setting Hammer.....	41	22.00
No. 106, Circular Saw Set, for Saws up to 48-inch dia.	46	29.35
No. 106A, Circular Saw Set, for Saws up to 72-inch dia.	60	33.00

Setting or Swaging Hammers—Each $\frac{3}{4}$ -inch, \$3.35; $\frac{1}{8}$ -inch \$4.00.

WRIGHT'S NEWLY IMPROVED NON-FRICTION BAND SAW GUIDE

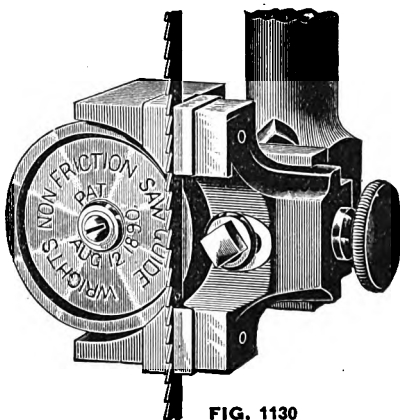


FIG. 1130

Wright's Newly Improved Non-Friction Band Saw Guide is the only guide having $1\frac{1}{2}$ -inch revolving bearings for saws, without crystallizing or disturbing their temper, thus overcoming the difficulty of saws breaking.

Are made as upper and under guide to fit any make machine, and to accommodate saws from $\frac{1}{16}$ to 10 inches wide. Are sold entirely on their merits, satisfaction being guaranteed. Fitted to any make machine.

No. 0 For Saw Teeth $\frac{1}{8}$ -inch to 1-inch wide....	Each	\$16.00
No. 1 For Saw Teeth $\frac{1}{8}$ -inch to $1\frac{1}{2}$ -inch wide, Each		18.65
No. 2 For Saw Teeth $\frac{1}{4}$ -inch to $2\frac{1}{2}$ -inch wide, Each		42.00
No. 3 For Saw Teeth 2-inch to 5-inch wide.....	Each	120.00
Special No. 0 Under Guide.....		14.85

SAW SWAGES

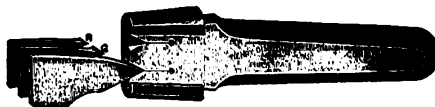
FORGED STEEL BODY, HARDENED FACE, INSERTED CRUCIBLE STEEL HARDENED JAWS



NO. 3—FIG. 1131



NO. 2—FIG. 1133



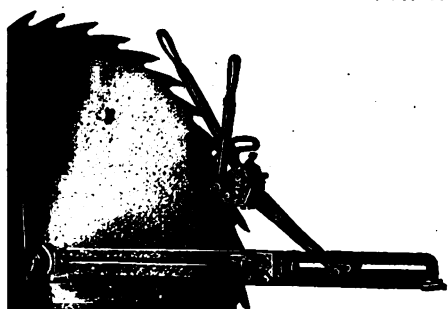
NO. 1—FIG. 1132

No. 3—Length $2\frac{1}{2}$ inches; for Small Circular Saw and Narrow Band Saws, not Heavier than 15 Gauge. Weight, each, about $\frac{1}{4}$ pound. Price each....	\$2.65
No. 2—Length $3\frac{1}{2}$ inches; for Small Circular and Mill Saws, not heavier than 10 gauge. Weight, each, about $\frac{1}{2}$ pound. Price each....	3.40
No. 1—Length 5 inches; for Large Circular Saws. Weight, each, about $1\frac{1}{4}$ pounds. Price each...	4.10

The upper opening in the swage being rounded on the bottom, takes its bearing on the center of the tooth, spreading and shaping it as shown on section of tooth H. The lower opening (in which section of tooth is inserted) is used for squaring up, and leaves the tooth as shown at G.

HANCHETT SAW SWAGES

FOR CIRCULAR SAWS—ADJUSTABLE



STYLE D—FIG. 1136

Made in five styles, as follows:

Style A. Without either bench attachment or jointer.

Style B. For swaging saw on arbor.

Style C. With bench attachment.

Style D. With bench attachment and jointer.

Style E. With bench attachment and combined jointer and side file.

Style	A		B		C		D		E	
	Approx. Wt. lbs.	Price Each	Approx. Wt. lbs.	Price Each	Approx. Wt. lbs.	Price Each	Approx. Wt. lbs.	Price Each	Approx. Wt. lbs.	Price Each
Size No. 1 for Saws 5-10 gauge	25	\$58.50	24	\$57.00	53	\$63.00	57	\$70.50	61	\$75.00
Size No. 0 for Saws 8-12 gauge.	18	54.00	17	52.50	46	60.00	50	67.50	54	72.00
Size No. 2 for Saws 11-16 gauge.	13	49.50	12	49.50	36	57.00	40	63.00	44	69.00
Size No. 3 for Saws 16-18 gauge.	..	.....	..	.....	16	48.00				
Size No. 4 for Saws 19-22 gauge.	..	.....	..	.....	7	45.00				

FOR BAND AND GANG SAWS

The Hanchett is the standard swage for circular band, gang, (or frame) and cylinder saws, now universally adopted by the great majority of users in nearly all saw mill and wood-working sections of the world. When the swage is used upon a gang saw, a fork is furnished that has no forward projection, thus making it more convenient for swaging the last teeth at the lower end of the saw.

	Approx. Wt. lbs.	Price each
Size No. 0 for Saws 8-13 Gauge	17	\$57.00
Size No. 1 for Saws 13-16 Gauge	12	49.50
Size No. 2 for Saws 16-18 Gauge	5	42.00
Size No. 3 for Saws 18-26 Gauge	3	39.00

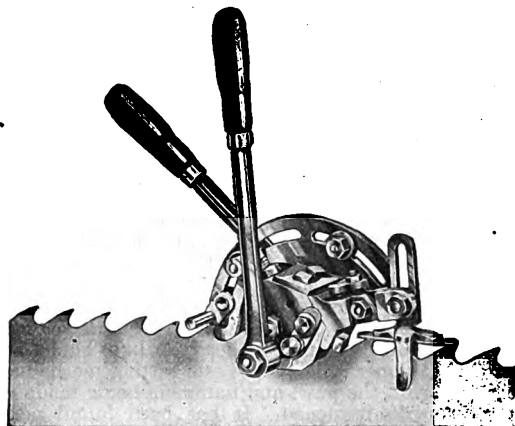


FIG. 1134

FOR BAND, GANG AND SHINGLE SAWS

A new type of swage of the greatest economy, accurate die action insuring strongest teeth, and more wearing surface for the dies than is possible with any other construction.

Long oval die presenting four wearing surfaces nearly full length of the die, and embodying a new design of eccentric movement especially favorable in action on the saw teeth, swaging to desired gauge without undue stress on the saw steel, making very strong corners and either short or long swage from point of tooth as may be desired.

For Band and Gang Saws

No. 10	For Saws 10 to 13 gauge.....	\$67.50
No. 12	For Saws 12 and 13 gauge.....	60.00
No. 14	For Saws 14 to 16 gauge.....	52.50
No. 15	For Saws 15 to 18 gauge.....	49.50
No. 16	For Saws 16 to 20 gauge.....	45.00

For Shingle Saws

No. 15	For Saws ($\frac{1}{8}$ or $\frac{1}{2}$ -inch die).....	49.50
No. 16	For Saws ($\frac{1}{8}$ -inch Die).....	45.00

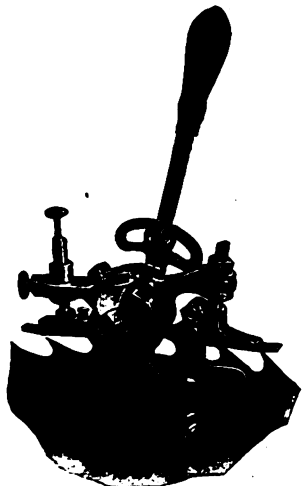


FIG. 1137



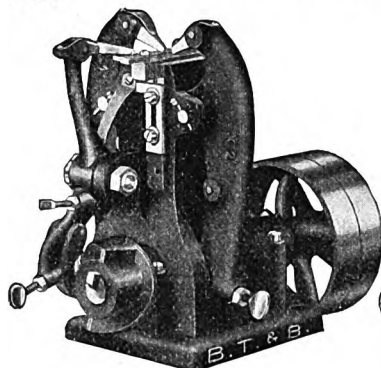
FIG. 1135

PRIBNOW SWAGE SHAPERS

No.

A1	For Band and Gang Saws from	12 to 16 Gauge.....	List Price	\$30.00
A2	For Band and Gang Saws from	17 to 24 Gauge.....		30.00
A3	For wide, heavy Band Saws from	12 to 14 Gauge.....		32.50
B1	For Band and Circular Saws from	6 to 13 Gauge.....		35.00
B2	For Band and Circular Saws from	13 to 16 Gauge.....		33.00
B3	For Band and Circular Saws from	16 to 22 Gauge.....		33.00

BAND SAW SETTING MACHINES



NO. 83-A

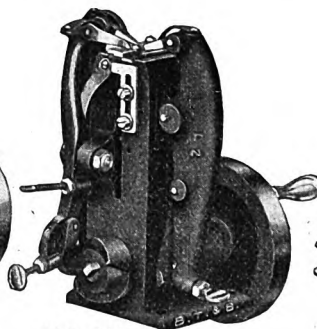
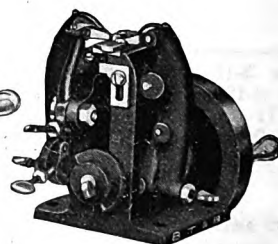


FIG. 1138
NO. 83



NO. 82

NO. 82 AND 83 AUTOMATIC HAND BAND SAW SETTER
(OPERATED BY HAND WHEEL)

NO. 83—FOR SAWS $\frac{1}{8}$ TO 3 INCHES WIDE, $\frac{1}{4}$ INCH SPACING OR LESS

NO. 82—FOR SAWS $\frac{1}{8}$ TO 1 INCH WIDE, $\frac{1}{8}$ INCH SPACING OR LESS

One revolution of pulley or crank feeds and sets two teeth, one to the right and the other to the left, the feed finger acting on the tooth being set. All these movements are automatic and rapid. The machine gives its blow in such a manner that the tooth stays where set, and as the force of the blow can be instantly regulated by thumb screws at lower end of setting lever it is readily adapted to heavy or light blades and to various grades of temper. The feeds and setting mechanism are strong and powerful, the pawl and hammers being made of finest steel and properly hardened. It has been found perfectly suited to all work within its capacity, giving entire satisfaction. The setters are adapted to teeth spaced from $\frac{1}{8}$ to $\frac{5}{8}$ inch between points. No. 83 furnished on order for teeth up to $1\frac{1}{4}$ spacing.

NO. 83-A POWER SETTING MACHINE

FOR SAW $\frac{1}{8}$ TO 3 INCHES WIDE, $\frac{1}{4}$ INCH SPACING OR LESS.

The No. 83A power setting machine has been produced to meet a demand coming from saw makers or woodworking plants having a large amount of setting to perform daily and requiring a rapid working, well built and lasting machine for this service. It has been run at a speed of 200 teeth per minute, although we do not recommend that it be run so rapidly, and if a speed of 100 or less teeth per minute be rapid enough for actual requirements, it should be so run. Each revolution of pulley feeds and sets two teeth.

PRICES

No. 82, Weight boxed 35 lbs.....	Price	\$51.35
No. 83, Weight boxed 80 lbs.....	Price	66.00
No. 83A Weight boxed 75 lbs.....	Price	102.65

THE BAUER IMPROVED BAND SAW SETTING MACHINE

SIMPLE, PRACTICAL, EFFICIENT

Saves 75% in Time and Gives a More Uniform and Accurate Set than if done by Hand.

Will give a fine, medium or coarse set.

The Feed Finger is adjustable to teeth from $\frac{1}{8}$ to $\frac{5}{8}$ inch space.

The Vise will take saws from $\frac{1}{8}$ inch to $1\frac{1}{2}$ in width and by automatically gripping the saw while tooth is being set, will prevent twisting of any fine and narrow saw blades.

All Adjustments for different widths, teeth, etc., are regulated by but two thumbscrews.

The Speed should be 100 revolutions (200 teeth) per minute. A saw can be set in four or five minutes. The machine can be operated by power if desired.

The machine is built solid and strong, yet the mechanism is so simple that anybody who can turn a crank can set a saw better than the best mechanic can do it by hand.

Price.....\$28.00

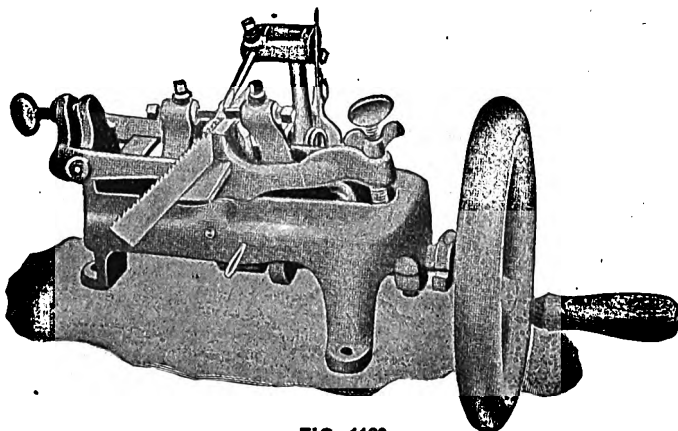


FIG. 1139

THE BAUER AUTOMATIC BAND SAW FILING MACHINE

Solidly built and so simple that it takes but a few moments to regulate and adjust the saws. Needs no attention, after once being started. The machine makes the same motion as a person would in filing by hand.

Old saws with uneven teeth are filed as perfect as new saws. All teeth are filed to a proportionate height. The pressure of the file is adjusted by a spring.

The files used are ordinary 6-inch taper saw files. Pressure of the file is adjusted by a spring.

Movable parts are operated by one shaft. No lost motion. No gears. Everything simple, durable and reliable. Fewer wearing parts, less repairs.

The Feed Finger is adjustable to teeth from $\frac{1}{16}$ to $\frac{5}{8}$ inch spacings.

The Vise will take saws from $\frac{1}{8}$ to $1\frac{1}{2}$ inches in width.

The speed should be from 50-60 revolutions per minute, the machine filing the same number of teeth.

No vibration. No Clutch Pulley, but a tight and loose pulley.

The machine does not injure the point of the tooth in any way and leaves no burr or bevel on the face or back of the tooth.

Price.....\$58.00

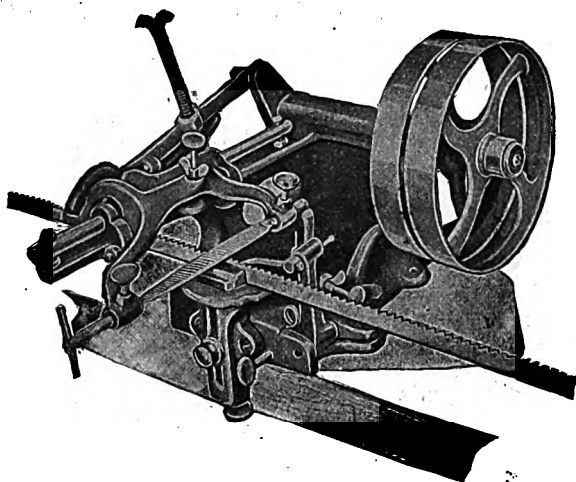


FIG. 1141

COMBINATION BAND SAW FILING, SETTING AND JOINTING MACHINE

MODELS K AND K-2

OPERATED BY HAND OR POWER

ONE OPERATION AUTOMATICALLY FILES, SETS AND JOINTS BAND SAWS.

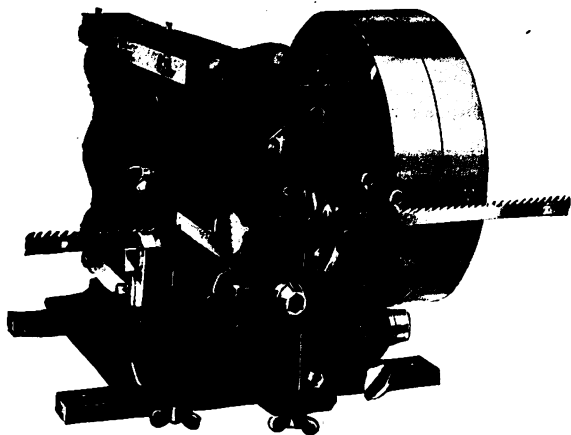


FIG. 1142

leave the teeth without a particle of burr. All teeth are filed and jointed to an exact uniform height and size. It means less breakage of saws, longer life, quicker work, and smoother and better cutting.

The setting device not only sets the teeth perfectly, but also each tooth in such a way as to allow the proper clearance behind the cutting edge.

All wearing parts are made of steel, and the vise, through which the saw passes, is steel lined.

The time it takes to file, set and joint band saws in one operation, is only a fraction of the time occupied in hand filing. Standard files, $4\frac{1}{2}$ inches extra slim taper or 7 inches slim taper, are used.

The Model K-2 is specially constructed for sharpening soft or medium tempered soft brass or aluminum cutting band saws.

These machines are in use by the United States Government and by all the large saw makers and users throughout the country.

MODEL K

For Woodworking Band Saws $\frac{1}{8}$ to 2 inches wide, 2 to 15 teeth to the inch.

Weight 93 lbs. Price on application.

Speed 65 R.P.M. by power. Floor space 12 x 10 inches.

MODEL K-2

For Metal Cutting Band Saws $\frac{1}{8}$ to 2 inches wide, up to 26 teeth to the inch.

Weight 97 lbs. Price on application

Drive Pulley 10x1 $\frac{3}{4}$ -inch face.

Can also be furnished direct connected motor drive and mounted on a column and base with reels for carrying saws.

PRICES ON APPLICATION

BAND SAW FILER

MODELS D AND D-2

OPERATED BY HAND OR POWER

Same machine as Models K and K-2 but without Setter.

MODEL D

For Woodworking Band Saws $\frac{1}{8}$ to 2 inches wide, 2 to 15 teeth to the inch.

Weight 80 lbs.

MODEL D-2

For Metal Cutting Band Saws $\frac{1}{8}$ to 2 inches wide, up to 26 teeth to the inch.

Weight 84 lbs.

Prices on application.

Speed, 65 R.P.M. Drive Pulley 10 x 1 $\frac{3}{4}$ -inch face. Floor Space 6 x 12 inches.

CAN ALSO BE FURNISHED MOTOR DRIVEN
PRICES ON APPLICATION

When ordering state the width and number of teeth to the inch in your different saws, so that the correct size of files may be furnished.

AUTOMATIC WOODWORKING BAND SAW GRINDER

MODEL A

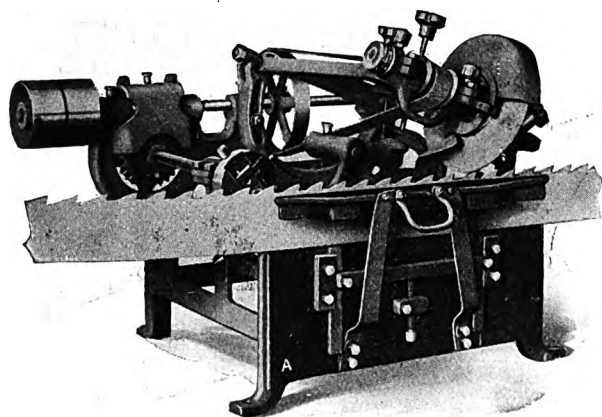


FIG. 1140

This Band Saw Grinder is accomplishing work never before done in the resharpener of band rips and re-saws from 1-8 to 8 inches wide, having teeth from the smallest in use up to those of two and one-half inches from point to point. So accurate is this machine in all its movements and so free from all vibration is the grinding wheel spindle—which is so essential—that the finest of teeth can be resharpener to within 1-2 of 1-1000th of an inch alike. This means that saws sharpened by this machine produce the finest of work.

In construction this machine is extremely rigid, a solid iron frame is used and all wearing parts are of steel. The grinding wheel spindle runs on bronze bushings and has radial and thrust adjustments. This spindle is suspended at the end of an arm hung between heavy adjustable steel pivots, and by this construction does away with slides which always wear and give trouble. One slotted universal cam permits of following all the different shaped backs of teeth, and a slotted eccentric with a screw feed and a marked scale allows the operator to make an immediate adjustment of the feed movement.

The machine is full automatic and once started needs no further attention. The saw is sharpened at the rate of from

45 to 55 teeth a minute. Every tooth is perfectly and accurately reground, as through the movement of the grinding wheel heat only the edge and not the side of the grinding wheel is used when sharpening the face of the tooth; this gets away from the old method of depending on the shape of the grinding wheel.

The operation of this machine is extremely simple; practically no time is lost in making adjustments. All adjustments have lock nuts. Used by all of the largest shipbuilding plants in the United States.

PRICE MODEL A ON APPLICATION

When ordering, send sketch or template of saws, showing width of saws, space and shape of teeth, in order that correct grinding wheel can be furnished.

CAN BE FURNISHED WITH A BELT CONNECTED SINGLE PHASE MOTOR

AUTOMATIC BAND SAW SHARPENER

NO. 2

CAPACITY FOR 4 TO 8 INCH SAWS

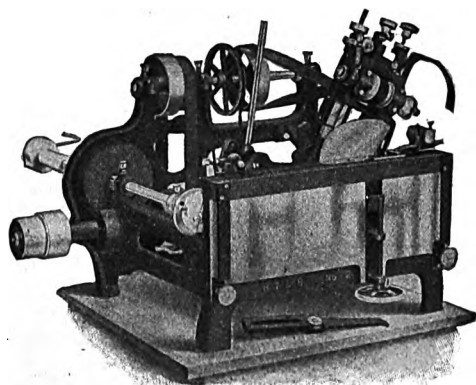


FIG. 1143

CUT SHOWS L. H.—THE SAW SURROUNDING SHARPENER.
ALSO MADE R. H.

Possessed of every desirable feature of adjustment to accommodate the different gullet outlines commonly employed on medium width log band or wide band re-saws. All adjustments readily understood and quickly made. An exact working, durable sharpener, that has been extensively marketed for many

years for use in saw works and mill or factory filing rooms in many different countries. Especially well designed and adapted for the requirements of customers in foreign countries.

T. and L. Pulleys 5-inch diameter for 2-inch belt, recommended speed 700 R.P.M.

Grinding Wheel 10-inch diameter, $\frac{3}{4}$ inch arbor hole thickness to suit. Floor space 30 x 36 inches. Extreme height 32 inches.

Designed for mounting on wood frame table, 21 x 27 inches 30 inches high.

Will be equipped on order for motor drive. Give current specifications. Suitable for saws having teeth spaced from 2 to 2 inches.

Specify Hand Required.

	Approx. Wt. Lbs.	Price
No. 2A Double Feed, with 6 Post Brackets and back pawl...	600	On Application
No. 2B With 36 in. adjustable pulleys to support saw.....	825	"
No. 2C R & L., Double Feed, 10 Post Brackets and back pawl	650	"
Special lateral adjustment for emery wheel arbor.....		ext
Blower outfit furnished.....		ext
Iron Legs for table furnished.....		ext

OPENING JAW CLAMP FOR BANDS, GANGS AND RESAWS

This clamp is manufactured in three sizes and is the most convenient type for medium width log bands or band resaws, because of the hinged jaw, which can be opened instantly to permit of the ready insertion of saw in clamp, or closed and locked by means of the clamping lever extending below table top, operated by foot movement. The rests for back of saw are readily adjustable for any width employed.

When saw is in position for clamping, the operator swings the open jaw upward into position, and locks same with lever.

The table top is amply large for usual filer's tools such as swage, shaper, side file, jointer, set gauge, saw set, wire gauge, emery wheel dresser or similar sundries.

Each jaw has two surfaced bearings against side of saw, assuring a straight and rigid clamping.

	Approx. Wt. lbs.	Price
No. 405 6-Inch Capacity, 36-Inch Jaws	160	\$73.35
No. 406 8-Inch Capacity, 42-Inch Jaws	210	84.35
No. 407 10-Inch Capacity, 48-Inch Jaws	260	95.35

An allowance will be made for legs, when not furnished.



FIG. 1144

HAND SHARPENER AND GUMMER

NO. 46

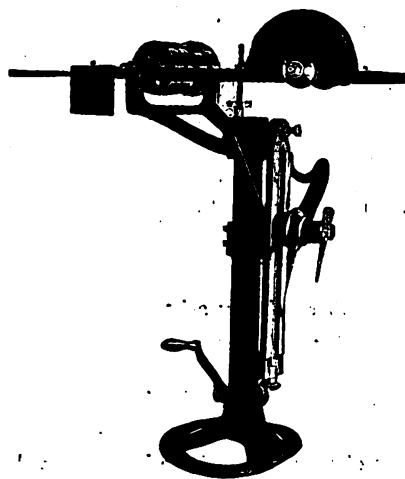


FIG. 1145

This sharpener has proven very popular in all mills or woodworking plants where a low price sharpener, readily adjustable and capable of doing excellent work, is required. A screw top regulates the depth of cut, any hook and any size of gullet outline may be obtained, subject to the use of grinding wheels of suitable thickness and shape on edge.

T and L pulleys 6-inch diameter for 2½-inch belt, recommended speed 1500 r. p. m.

Grinding wheel, for large size, 12 inches diameter, 1½-inch arbor hole; for small size, 10 inches diameter, 1½-inch arbor hole; thickness to suit.

Floor space, large size: 42 x 36 inches. Extreme height 66 inches.

Floor space, small size: 13 x 16 inches. Extreme height 38 inches.

Will be equipped on order for motor drive. Give current specifications.

Special grinding wheels, saw cones and wheel dresser, furnished on order.

Small Size 8 to 40-inch capacity. Weight 200 lbs. Price \$80.65

Large Size 14 to 72-inch capacity. Weight 350 lbs. Price 110.00

REGULAR EQUIPMENT—One grinding wheel, internal belting, with saw cone to accommodate arbor hole from 1 to 2½ inches diameter.

MUNSON BALANCING MACHINES FOR PLANER, STICKER, SHAPER OR HOG KNIVES

BALANCE YOUR KNIVES ENDWAYS AND ALSO FOR TOTAL WEIGHT. THE MUNSON BALANCE DOES BOTH

Will Balance Endways and Total Weight at Same Time. Indispensable for Accurate Work.

It Saves Time, Labor, Repairs, Knives, Machines, Money. Slides "C" "C" will instantly and correctly center any knife from 41 inches down and slides move but 3 inches.

Pointer "A" will show if one knife is heavier than the other.

Pointer "B" will show if one end of a knife is heavier than the other end and indicate which end. For a correct balance both of the errors must be corrected.

Will do its work in from one-third to one-tenth the time of any other balance.

PLANER KNIFE BALANCE

No. 104 Munson Balance for Knives up to 41 inches, Weight 150 lbs.....Price \$58.70

No. 104A Munson Balance for Knives up to 60 inches, Weight 175 lbs.....Price \$73.35

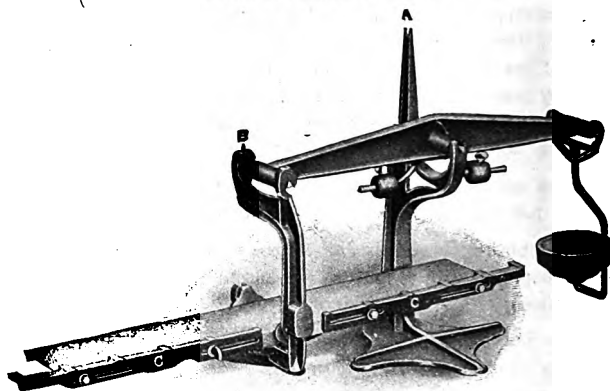


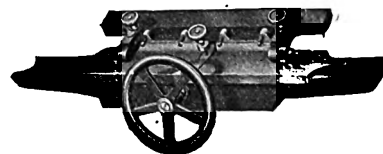
FIG. 1146

HAND FEED KNIFE GRINDERS



NO. 426-FIG. 1147

No. 426 will take knives up to 32 inches long. Can be attached to any grindstone frame. Adjustable knife holder. Sliding Carriage.....Price \$37.00



NO. 426A-FIG. 1148

No. 426A will take knives up to 36 inches long. Adjustable knife holder. Carriage travels by means of rack and pinion operated by hand wheel.....Price \$51.00

BAND SAW BRAZING FORGES FOR BAND RIPS, RESAWS AND LOG BANDS

Every mill or factory filing room ought to be equipped with a special type brazing forge for heating brazing irons uniformly throughout their entire length and to reduce fire risk to the minimum.

The fire box is of cast iron, corked tight with asbestos, and provided with a hinged front that closes. A common stove pipe may be used to conduct away the smoke. Coal is usually employed for heating purposes and the blast is ample to heat brazing irons to a cherry red in 10 minutes.

Fire hazard is practically eliminated.

Power is imparted to the fan in the smaller sizes by a handwheel, operated through a set of cut spiral gears, enclosed in a cast iron housing, and in the larger sizes by a segment and pinion operated by a hand lever.

All sizes and types may be equipped on special order with T and L pulley, at \$11.00 additional charge.

The safety, convenience and efficiency of these forges have been generally recognized for many years, so much so that very few open hearth portable forges are now sold for the heating of brazing irons.

No. 441, 6-inch Band Saw Brazing Forge, weight 400 pounds. List price..each \$88.00
No. 442, 10-inch Band Saw Brazing Forge, weight 500 pounds. List price..each \$95.00

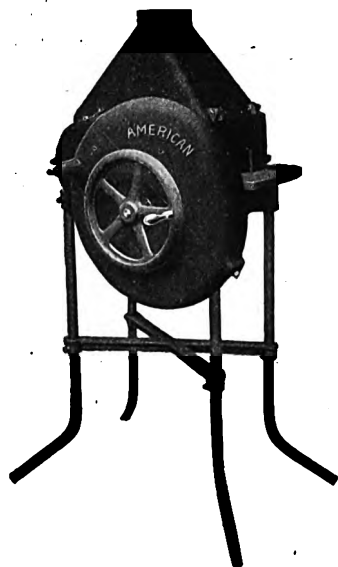


FIG. 1149

IMPERIAL LEAD BURNING OUTFITS

The Imperial Lead Burning Outfits are highly satisfactory for burning storage battery terminals in garages, telephone, electric power and signal plants, etc.; repairing auto radiators, for making lead-lined tanks and vats; in plumbing work (better than wiped joints); for joining lead pipe lines; splicing lead-covered cables; for jewelers' work; for laboratory purposes; melting platinum, and for numerous manufacturing operations.

It is a simple, inexpensive, safe and efficient means for making lead joints of all kinds. Produces a homogeneous union, strong as the original metal and of as high electrical conductivity. Faster than the old method. The extremely hot, needle-point flame is easily manipulated and the results are most satisfactory.

The various combinations of gases that are most readily available are named under the illustrations on this page. This flexibility of Imperial Equipment makes it available wherever lead burning would be carried on. One or another of these combinations can be obtained anywhere with little trouble and small expense.

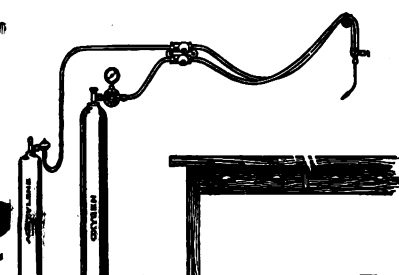


FIG. 1160

NO. 20 OUTFIT. FOR USE WITH ACETYLENE AND OXYGEN

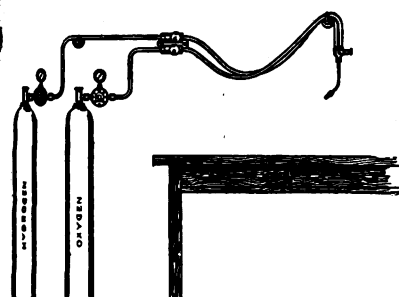


FIG. 1161

NO. 21 OUTFIT. FOR USE WITH HYDROGEN AND OXYGEN

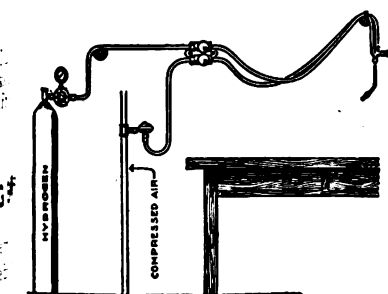


FIG. 1162

NO. 22 OUTFIT. FOR USE WITH HYDROGEN AND COMPRESSED AIR

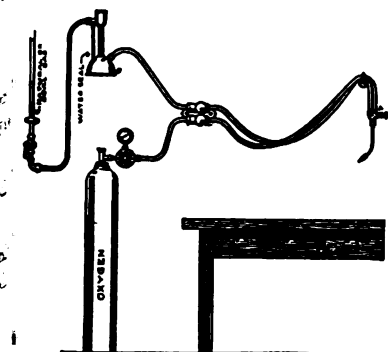


FIG. 1163

NO. 24 OUTFIT. FOR USE WITH ILLUMINATING GAS AND OXYGEN

NO. 20 IMPERIAL LEAD BURNING OUTFIT

For use with dissolved acetylene gas and oxygen in high pressure tanks. (Large or small size acetylene tanks may be used.)

Outfit consists of: 1 Type F Oxygen Regulating Valve with 15 lb. Pressure Gauge, 1 Type 10R Acetylene Constant Pressure Regulator, 35 feet $\frac{1}{8}$ in. Special Rubber Hose, 1 Bench Block with 2 Needle Valves, 1 Type L Imperial Lead Burning Torch with 4 Tips, 1 Wrench. Outfit packed in individual carton. This outfit can also be used for light welding on all metals.

No. 20 Lead Burning Outfit. Price..... \$33.35

NO. 21 IMPERIAL LEAD BURNING OUTFIT

For use with hydrogen and oxygen in high pressure cylinders.

Outfit consists of: 1 Type F Oxygen Regulating Valve with 15 lb. Pressure Gauge, 1 Type FH Hydrogen Regulator with 15 lb. Pressure Gauge, 35 feet $\frac{1}{8}$ in. Special Rubber Hose, 1 Bench Block with 2 Needle Valves, 1 Type L Imperial Lead Burning Torch with 4 Tips, 1 Wrench. Outfit packed in individual carton. This outfit can also be used for light welding on all metals.

No. 21 Lead Burning Outfit. Price..... \$40.00

NO. 22 IMPERIAL LEAD BURNING OUTFIT

For use with hydrogen gas in high pressure tank and compressed air.

Outfit consists of: 1 Type FH Hydrogen Regulating Valve with 15 lb. Pressure Gauge, 1 Type 10R Constant Air Pressure Regulator, 35 feet $\frac{1}{8}$ in. Special Rubber Hose, 1 Bench Block with 2 Needle Valves, 1 Type L Imperial Lead Burning Torch with 4 Tips, 1 Wrench. Outfit packed in individual carton.

No. 22 Lead Burning Outfit. Price..... \$33.35

NO. 24 IMPERIAL LEAD BURNING OUTFIT

For use with illuminating gas (Hydro-carbon gas) or natural gas and oxygen in high pressure tanks.

Outfit consists of: 1 Type F Oxygen Regulating Valve with 15 lb. Pressure Gauge, 1 Imperial Hydraulic Back Pressure Valve and Purifier for Coal Gas or Natural Gas, 35 feet $\frac{1}{8}$ in. Special Rubber Hose, 1 Bench Block with 2 Needle Valves, 1 Type L Imperial Lead Burning Torch with 4 Tips, 1 Wrench. Outfit packed in individual carton.

No. 24 Lead Burning Outfit. Price..... \$33.35

NO. 26 IMPERIAL LEAD BURNING OUTFIT

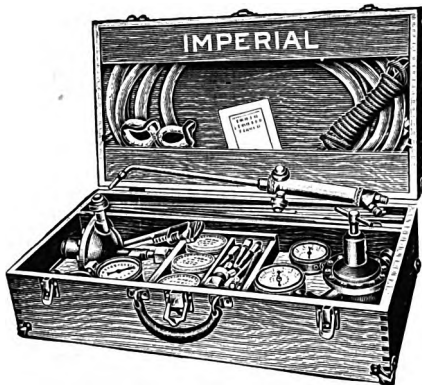
For use in connection with regular Imperial Oxy-Acetylene Welding Outfits.

Outfit consists of: 1 Type L Imperial Lead Burning Torch with 4 Tips, 1 Bench Block with 2 Needle Valves, 16 feet $\frac{1}{8}$ in. Special Rubber Hose, 1 Wrench. Outfit packed in individual carton.

No. 26 Lead Burning Outfit. Price..... \$12.00

IMPERIAL WELDING AND CUTTING OUTFITS

OXY-ACETYLENE PROCESS



**NO. 1 IMPERIAL WELDING OUTFIT
IN CARRYING CASE—FIG. 1150**

NO. 1 IMPERIAL WELDING OUTFIT

For all general welding work, from thin sheet metal to heaviest castings.

Consists of Type B Imperial Welding Torch with 10 welding tips, extension, decarbonizing torch, regulators, 4 gauges, hose, connections, goggles, hand-book, carrying case, complete supply of welding materials, ready for service.

Each.....\$100.00

NO. 3 IMPERIAL CUTTING OUTFIT

For light and heavy cutting, from thin sheet metal to heaviest structural iron and similar work.

Consists of Type E Imperial Cutting Torch with 2 housings and 4 tips, regulators, 4 gauges, hose, connections, goggles, hand-book, carrying case, etc., complete, ready for service.

Each.....\$126.65

NO. 5 IMPERIAL DUPLEX WELDING AND CUTTING OUTFIT

Best all purpose apparatus obtainable at any price. Fully adequate to handle all welding and cutting for which the process is adapted.

Consists of a complete No. 1 Imperial Welding Outfit as described above and also includes a Type E Imperial Cutting Torch with 2 housings and 4 tips and an extra pair of goggles and 25-ft. lengths of hose.

Each.....\$160.00

ACETYLENE REGULATOR

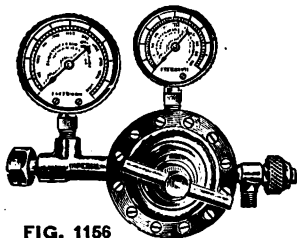


FIG. 1156

OXYGEN REGULATOR

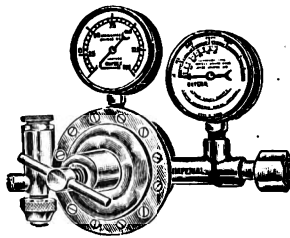


FIG. 1157

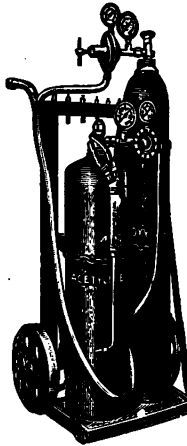
Type AA Imperial Acetylene Regulator, as furnished with Imperial Welding and Cutting Outfits Nos. 1, 3, and 5.....\$29.35

Type A Imperial Oxygen Regulator, as furnished with Imperial Welding and Cutting Outfits Nos. 1, 3, and 5.....\$33.35

Imperial Equipment is thoroughly practical, economical and safe. It is furnished in four outfits as listed below to meet the various requirements of service.

No other torch has a mixing principle like the IMPERIAL—scientific, practical, years ahead. IMPERIAL TORCHES are approved by the Underwriters' Laboratories of the National Board of Fire Underwriters. No other regulator so accurately and uniformly controls delivery of gases—none has its automatic safety features.

**NO. 1 IMPERIAL WELDING OUTFIT
MOUNTED ON PORTABLE TRUCK.
(Tanks are not included) FIG. 1151**



TYPE B IMPERIAL WELDING TORCH

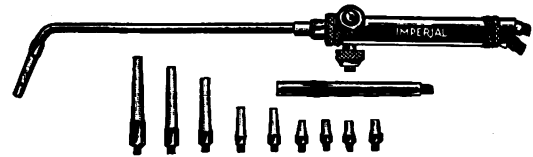


FIG. 1152

Furnished with Imperial Outfits Nos. 1 and 5.....\$33.35

TYPE E IMPERIAL CUTTING TORCH

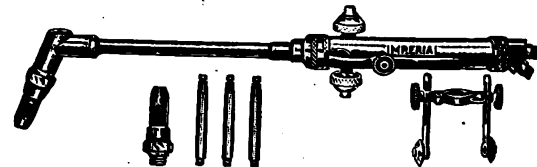


FIG. 1154

Furnished with Imperial Outfits Nos. 3 and 5.....\$60.00

IMPERIAL TRUCK

Is a great convenience when outfit is to be frequently moved around shop or yards.

No. 51-H For two one hundred-foot tanks.....\$19.35

No. 52-H For one two hundred and one three hundred-foot tank.....26.65



FIG. 1155

IMPERIAL OXYGEN DECARBONIZING OUTFIT

The Imperial Decarbonizing Outfit is of correct design, well made of the best materials, and will last for years.

All traces of carbon can easily be removed from the cylinders of an automobile engine with the Imperial Decarbonizing Outfit in less than thirty minutes, at the small cost of from 10 to 15 cents per cylinder.

It will readily be seen that this is a wonderful improvement over the old, expensive and slow process of removing carbon by scraping the cylinder, and that the operation is a very profitable one to the garage owner.

Every garage should have the Imperial Outfit. Oxygen can be purchased from service stations located in most prominent cities with free use of the cylinders.

No. 6 outfit consists of Type G Decarbonizing Torch, Type D Regulator, gauge, hose, connections, etc. (Tank not included.) Each.....\$20.00

FIG. 4062

IMPERIAL TIPS, HOUSING AND HOSE CONNECTIONS

INSTRUCTIONS FOR SELECTION AND USE OF IMPERIAL WELDING AND CUTTING TIPS

Cutting with Oxy-Acetylene

Size Cutting Tip, No.	Thickness of Steel or Wrought Iron to be cut, inches	Pressure Required	
		Oxygen Pounds	Acetylene Pounds
1	1/4 to 2	30 to 60	5 to 10
2	2 to 4	60 to 80	10
3	4 to 6	80 to 100	10
4	6 to 9	100 to 125	10 to 15
5	9 to 12 and over	125 to 150	15

Cutting with Oxy-Hydrogen

Size Cutting Tip, No.	Thickness of Steel or Wrought Iron to be cut, inches	Pressure Required	
		Oxygen Pounds	Acetylene Pounds
1-H	1/4 to 2	30 to 40	5 to 10
2-H	2 to 4	50 to 70	10 to 15
3-H	4 to 6	80 to 100	15 to 20
4-H	6 to 9	100 to 125	20 to 25
5-H	9 to 12 and over	125 to 150	25 to 30

Welding with Oxy-Acetylene

Size Welding Tip, No.	Thickness of Metal to be welded, inch	Pressure Required	
		Oxygen Pounds	Acetylene Pounds
1	1/16	3	2
2	1/8	5	3
3	1/4	6	4
4	3/8	7	5
5	1/2	8	6
6	5/8	9	7
7	3/4	10	10
8	7/8	12	12
9	1	14	14
10	1 and over	18	15

Welding with Oxy-Hydrogen

Size Welding Tip, No.	Thickness of Metal to be welded, inch	Pressure Required	
		Oxygen Pounds	Acetylene Pounds
1-H	1/16 to 1/8	10	10
2-H	1/8 to 1/4	12	12
3-H	1/4 to 3/8	15	15
4-H	3/8 to 1/2	20	20
5-H	1/2 and up	25	25

Minimum and Maximum pressures as indicated are to be used for the corresponding thickness of metal to be cut. For intermediate sizes use pressures in proportion.

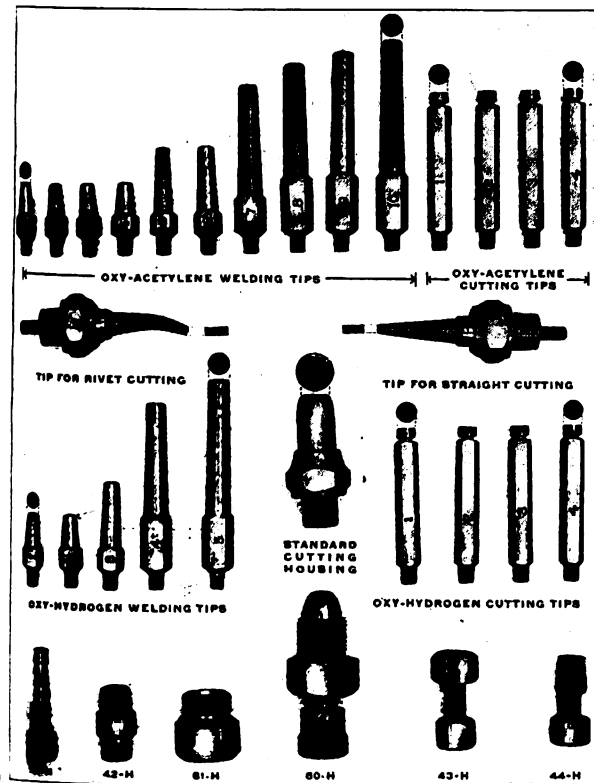


FIG. 1159

NOTE: NOS. 41-H, 42-H, 43-H AND 44-H ARE HOSE CONNECTIONS; NOS. 60-H AND 61-H ARE ADAPTERS FOR CONNECTING REGULATORS TO GAS TANKS

IMPERIAL WELDING TIPS

OXY-ACETYLENE

Each

Nos. 1, 2, 3, 4, 5 and 6.....\$1.00
Nos. 7, 8, 9 and 10.....1.65

The above Tips, Nos. 6, 7, 8, 9 and 10, with copper ends, furnished on request at 50c each extra cost over above prices.

OXY-HYDROGEN

Nos. 1, 2 and 3.....\$1.00
Nos. 4 and 5.....1.65

IMPERIAL CUTTING TIPS

Each

Cutting Tips, Oxy-Acetylene, Nos. 1, 2, 3 and 4.....\$1.35
Cutting Tips, Oxy-Hydrogen, Nos. 1, 2, 3 and 4.....1.35
Rivet Cutting Tips, Oxy-Acetylene, Nos. 1 and 2.....4.00
Straight Cutting Tips, Oxy-Hydrogen, Nos. 1 and 2.....4.00
Straight Cutting Tips, Oxy-Acetylene, Nos. 1 and 2.....4.00
Straight Cutting Tips, Oxy-Hydrogen, Nos. 1 and 2.....4.00

(The price of Rivet Cutting and Straight Cutting Tips includes special housing for each.)

IMPERIAL HOUSING

Housing for Types D and E Imperial Cutting Torches.....\$1.35

IMPERIAL HOSE CONNECTIONS

No. 41-H Imperial Oxygen or Acetylene Hose Connection \$0.60
No. 42-H Imperial Hose Connector (for joining two lengths)......50
No. 43-H Special Hose Connection......80
No. 44-H Special Hose Connection......65

IMPERIAL TANK ADAPTERS

No. 60-H Adapter for attaching Imperial Regulators to Prest-O-Lite Tanks.....\$2.00
No. 61-H Adapter for attaching Imperial Regulators to Searchlight or Commercial Tanks.....1.00

SAFETY GOGGLES

IMPERIAL WELDING AND CUTTING

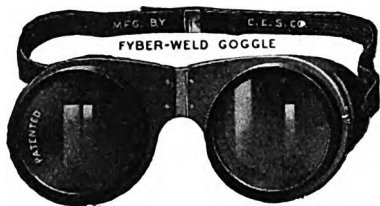


FIG. 1228

STYLE 47H FYBER-WELD

The No. 47H Goggles are light, rust-proof, sanitary, strong and perfect fitting. The Essentialite Lenses afford full protection to the eyes.

The No. 48H Goggles have the wire shield and other metal parts covered with chamois. The nose piece is soft leather.

Lenses furnished are amber, dark blue or smoked green, as preferred. When ordering, state color wanted.



FIG. 1229

STYLE 48H CHAMOIS FRAME

No. 47H Fyber-Weld Welding and Cutting Goggles, per pair.....

No. 48H Chamois Frame Welding and Cutting Goggles, per pair.....

Extra Single Lens for No. 47H, price each.....

Extra Single Lens for No. 48H, price each.....

\$3.30

2.60

1.30

.60

MOHR WELDING AND CUTTING

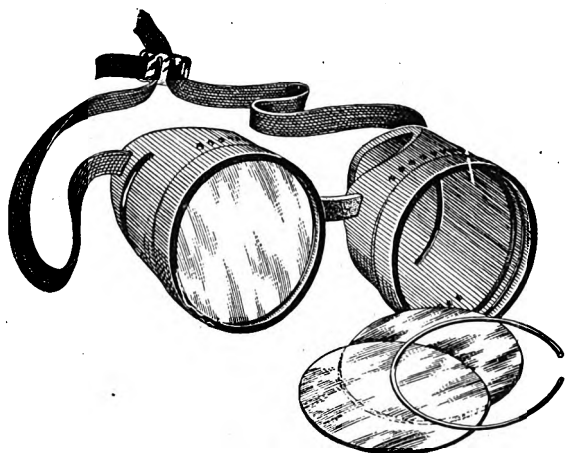


FIG. 4043

The frame is moulded Condensite which is a non-conductor of heat and electricity and is waterproof so that the goggle can be thoroughly cleaned and sterilized. The eye cups are moulded to fit closely around the eyes, the lenses being held in place by spring rings. All goggles are supplied with cover glasses which prevent the dark protecting lens from becoming pitted. Cover glasses are easily replaced by removing the spring ring and new ones can be furnished at a very nominal cost.

Extra parts, such as eye cups, head bands, lenses, etc. can be supplied.

Price per pair.....\$2.60

WILLSON WELDING AND CUTTING STYLE L1

Provides the utmost face-comfort and eye protection. It is a non-metallic, non-conductive "drop-eye" goggle permitting easy adjustability, freest ventilation and widest vision. All parts can be replaced with the bare hands. 2 3/4 inch eye cups, adjustable leather bridge, detachable elastic head band, removable ventilating ports, and Willson Industro Lenses. These are protected by a thin, clear cover glass, easily replaced. No harmful light can reach the eye through any part of the goggle.

Price per pair, including metal case.....\$4.66



FIG. 4044

WILLSON RUBBER FOR CHEMISTS AND OTHERS TO BE PROTECTED FROM ACIDS, GASES AND FINE DUST



FIG. 1230

A ventilated rubber goggle recommended for protection against gases, acids and dangerous liquids. Each pair in cardboard box.

Price per pair.....\$1.00

SAFETY GOGGLES

HARDY WELDING AND CUTTING



FIG. 1231

The material of which the eye cups are made is

A Non-Conductor of electricity.

A Non-Conductor of heat.

It is Non-Inflammable and infusible.

It is very hard and retains its finish.

It is high in mechanical strength.

It will not warp or distort.

It will not absorb moisture.

It is not affected by temperature below 300 degrees F.

It is not affected by the moisture of the body.

It has no effect upon the skin or flesh.

It is easily sterilized by any method.

The eye cups are held together in front by a leather connection that is easily changed for either purposes of adjustment or sterilization. They are held together behind by silk elastic and fitted with an adjustable fastening that is permanent after the glass has once been fitted to the head of the wearer. These fastenings are fastened to the eye cups through slots in the material and can be changed or replaced in an instant.

The construction of the lens cups is as shown in the illustration.

They are made so as to fit the curves of the face and to exclude all outside light.

Each lens cup is ventilated above and below but so as not to permit of light getting to the eyes.

There is a perspiratory outlet in each of the ventilating slots.

The lenses are held in place against an outset ledge by threaded rings of the same material that fit into the lens cups which are also threaded thus making it a simple matter to remove or replace the lenses.

These rings fit easily and are removed by a few turns of the flat of the hand laid over them.

This construction also permits the use of cover glasses of white glass which can be used to protect the more expensive welding lenses and can be easily and cheaply replaced when splattered or marked.

Absolutely no metal is used in this protector thus insuring absolute protection from electricity.

Hardy Welding Glasses complete with Noviweld lenses and white cover glasses.....	per pair	\$ 3.00
Noviweld lenses only to fit Hardy Welding Glass.....	per dozen pair	18.00
Hardy Welding Glass mounting, complete with No-Glare lenses and white cover glasses.....	per dozen	24.00
White cover glass lenses only to fit Hardy Welding Glass.....	per dozen pair	2 50
Lens cups only.....	per dozen pair	9.60
Rings only.....	per dozen pair	2.50
Head Elastics.....	per dozen pair	1.00
Slides for holding Head Elastics.....	per dozen singles	.25

WILLSON ALL-PURPOSE INDUSTRIAL

STYLE L31

Aluminum Cup Goggle. 1¼ inch clear ground and polished lenses. All parts easily placed. Rubber edging. Detachable elastic head band. Built for extra hazardous work (heavy chipping and rivet-cutting) yet so light in weight and comfortable that it is continuously in semi-hazardous operations such as grinding and polishing. Only the face touches the face.

Price per pair.....\$2.00



FIG. 4045

WILLSON SAFETY FLANGE

STYLE F3

Willson Safety-Flange Goggle with improved bridge-and-bar rigid construction. Used by those who do not wish an adjustable goggle for extra-hazardous work. Its features include a broad saddle bridge in three sizes, reinforced wire screen side-guards, thick ground and polished chippers' glass, and flexible cable ear-bows. Rim diameter, 1⅞ inch. Specify broad (A), medium (B), or narrow (C) bridge.

Price per pair.....\$1.67



FIG. 4046

SAFETY GOGGLES

FOR GRINDERS AND MACHINISTS

ALBEX STYLE A1

Albex Eye Protectors are designed for grinding, light foundry work and weldings. They protect against light particles, dust, acids, heat and glare.

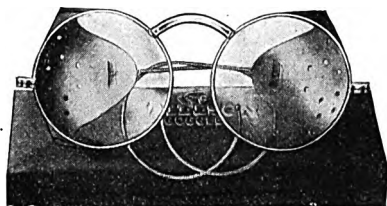


FIG. 1226

Widely used by machinists, grinders, autoists, and railroad men. Specifications: Adjustable bridge, flexible cable earbow, ventilated leather side-guards, and curved (micoquille) 1 1/8 inch lenses in amber and smoke tints, or clear. The lenses and side guards are interchangeable by means of screw joint end piece. Each pair in a strong metal case.

Price per pair.....\$1.30

STYLE M1

A very substantial rustproof goggle with the Willson Adjustable Bridge, wirescreen sideguards, and flexible cable earbows. Furnished with ground and polished clear 1 1/8 inch lenses, or amber or clear curved lenses. Each pair in a strong metal case.

Price per pair.....\$2.00

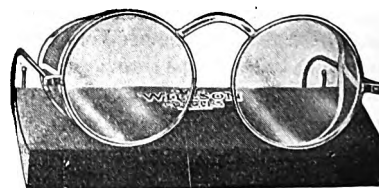


FIG. 1225

FOR FURNACEMEN AND WELDERS WITH TWO COLOR LENSES

STYLE A9

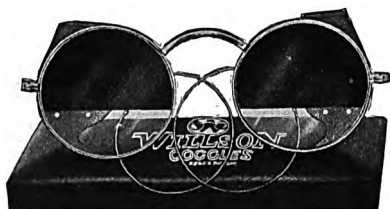


FIG. 1227

Same as Albex Eye Protector, but with bi-color lens. Cobalt blue, larger upper part protects from intense heat and blinding glare, while uncolored small lower section permits welder to move about freely. Ventilated leather side-guards. We recommend this style for furnacemen, pourers, etc.

Price per pair, including steel cases.....\$2.00

HAUCK COMPRESSED AIR SUCTION TORCH

FOR SKIN DRYING MOLDS, BRAZING, PRE-HEATING AND OTHER HEATING OPERATIONS

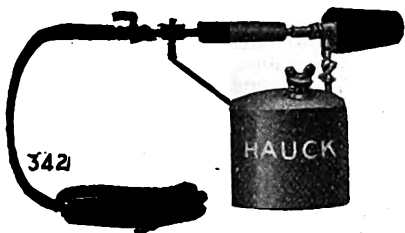


FIG. 4047

Lights instantly as soon as a valve is opened—no preheating. Burns fuel or kerosene oil.

Operates with compressed air at any pressure.

Absolutely safe—no pressure in tank at any time as oil is syphoned to burner.

Produces an intense, powerful, clean flame, which can be regulated as desired.

Does not carbonize. WILL HEAT A 4-INCH SHAFT IN FIVE MINUTES.

No.	Capacity of Tank	Hose	Price
342	½ gal.	6 ft.	\$21.87
343	1 gal.	6 ft.	26.87
344	1½ gal.	6 ft.	33.12

HAUCK KEROSENE TORCHES

TANK is of steel, tinned in and outside, is rust proof; all seams and fittings welded or brazed.

PUMP is quick acting type of heavy brass 1" diameter, is powerful and of greater capacity than used in any other torches on the market.

BURNER is constructed of special heat resisting metal; vaporizes any grade of kerosene or coal oil, produces an intense reddish blue flame which is steady, clean and without smoke or soot. Solid nozzle casting. Straight line oil passageways—no coils. Simple and easily accessible for cleaning. Carbonization reduced to a minimum.

Nos. 14, 15 and 16 torches are equipped with automatic check to prevent back pressure from getting into tank which remains cool during operation. Nos. 15 and 16 sizes are supplied with pressure gauges.

The flame of No. 14 torch will melt a piece of copper ½ in. x ¼-in. in three minutes; ½-in. brass rod in two minutes. It will heat a 2-in. shaft red hot in five minutes.

Can also be used with gasoline when preferred. Torches can also be furnished with vertical burners if specified.

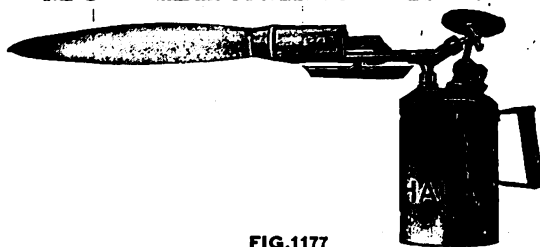


FIG. 1177

No.	Capacity	Oil Consumption per Hour	Length Full Flame	Price Complete
10	1 Quart	1 Pint	7 in.	\$10.00
14	½ Gal.	1 Quart	13 in.	20.00
15	1 Gal.	2 Quarts	16 in.	25.00
16	1½ Gal.	3 Quarts	18 in.	31.00

HAUCK PORTABLE OIL BURNER

COMPRESSED AIR TYPE

Wherever compressed air is available this type is preferred. Flame is steady, easily regulated to proper size and burner can be operated under any pressure varying from 10 to 120 pounds. Any grade of Fuel, Crude or Kerosene Oil may be used.

Will ignite instantly without previous heating.

The following table gives sizes and information of these standard outfits.

Can also be furnished mounted on trucks, but will be furnished as illustrated unless otherwise specified.

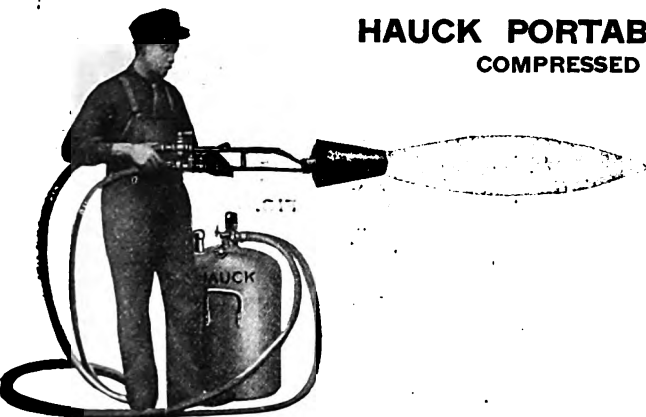


FIG. 1178

No.	Cap. of Tank Gals.	One Length Oil & Air Hose Ft. each	Oil Con. per Hour Gals.	Air. Con. Free Air per Minute	Net Weight Complete Outfit Lbs.	Weight of Burner Lbs.	Price Complete
1	16	12	5	20 cu. ft.	90	19	\$161.00
2	15	12	4	15 cu. ft.	85	16	136.00
4	12	12	3	12 cu. ft.	70	13	111.00
5	10	12	2	8 cu. ft.	60	8	97.50
5A	5	12	1	5 cu. ft.	45	5	70.75

HAUCK COMBINATION MELTING FURNACE AND PORTABLE HEATER

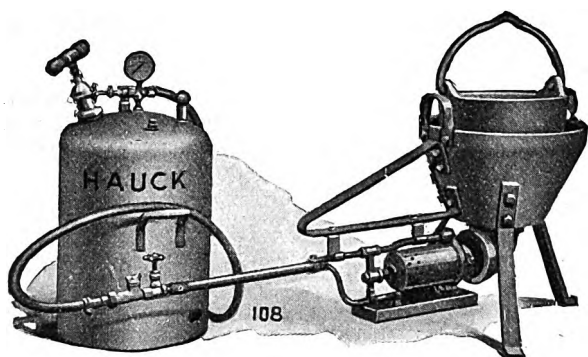


FIG. 4048

One of the most practical and economical devices for machine shops, water works, junk dealers, printers, etc., is the Combination Lead Melting Furnace and Portable Oil Burner as shown in illustration. It is actually two outfits in one. Can be used as a furnace for melting lead or other soft metals.

Or, the portable burner is instantly detached from furnace and used for a wide variety of heating operations, such as melting babbitt out of bearings, heating bearings for rebabbiting, expanding to make shrink fits, straightening, melting lead out of pipes and fitting joints, preheating before welding, brazing, etc.

The Furnace shown in illustration is the smallest size with 125 lb. pot, melts 100 lbs. of lead in 14 minutes. Burner consumes less than 3 pints of kerosene oil.

With the larger furnaces 200 lbs. of lead melted in 15 minutes.

450 lbs. of lead melted in 20 minutes.

Cost to keep in molten condition 8 to 10 cents an hour.

Additional supply of fresh lead melts instantly.

The burner and construction of the tank is similar to those shown on page 333.

No.	Capacity of Pot	Capacity of Steel Hand Pump Tank	Oil Consumption per Hour	Length of Oil Hose	Shipping Weight of Outfit	Price Complete
107	125 lbs.	5 gal.	3 pts.	6 ft.	100 lbs.	\$ 53.00
108	200 lbs.	10 gal.	2 gal.	12 ft.	210 lbs.	100.00
109	450 lbs.	12 gal.	2½ gal.	12 ft.	260 lbs.	120.00

Can be furnished with Compressed Air Burners as illustrated on page 331, Fig. 1178, wherever Compressed Air is available.

HAUCK HEATING FURNACE

For heating soldering irons, tool dressing, annealing and other heat treating operations.

Combustion chamber of furnace is lined with special fire brick and is supplied with a curved iron cover. Charging door is 2½ inches high x 10 inches long.

The torch shown is the No. 15 size—one gallon capacity as described in detail on page 331, Fig. 1177.

Hauck suction torch illustrated on page 331, Fig. 4047, may also be used with this furnace as well as other types of portable burners.

Price of furnace complete with torch.....\$43.00

When furnace is not in use, torch need not remain idle, as it can be advantageously used for brazing, expanding, etc.

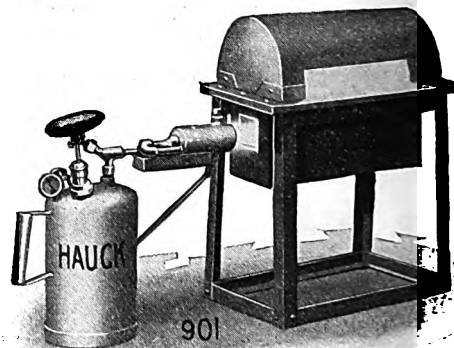


FIG. 4049

HAUCK OIL RIVET FORGES

Average approximately 1800 ½-inch rivets 8 hours. Tank capacity, 13 gallons.

Burners on these forges light instantly. Temperature easily regulated. Flame does not strike rivets direct.

Has perforated fire brick tile tops, where the rivets may be dumped and preheated by the hot waste gases.

This gradual preheating minimizes scaling. The rivets are dropped down into the heating chamber where they are quickly brought to the proper working temperature.

Each forge has a blast pipe in front of charging door to protect operator.

For outside work where the air lines are found to contain considerable quantities of water, we supply the forges with water traps.

Oil consumption 1 to 1½ gallons per hour.

Air required for atomizing 8 to 10 cubic feet per minute. Weight 200 lbs.

Price, complete\$113.00



FIG. 4050

HAUCK HAND PUMP TYPE BURNER

BURNS KEROSENE (COAL OIL)—NO COMPRESSED AIR REQUIRED

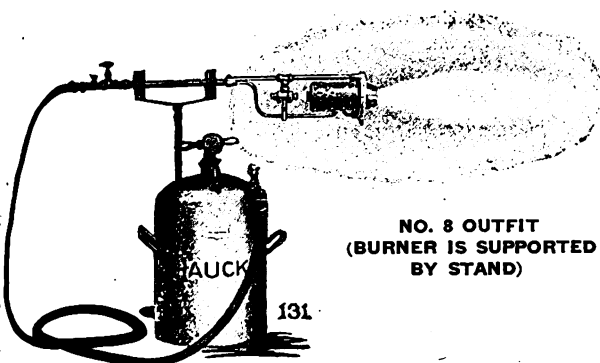


FIG. 1180

NO. 8 OUTFIT
(BURNER IS SUPPORTED
BY STAND)

This burner is of the vaporizing type, operating without compressed air; especially suitable for yard and shop work. The flame is intense and is easily regulated as desired. Before operating it is necessary to pump up from 30 to 60 pounds pressure into tank for forcing the oil to the burner; the burner does not use air from tank, therefore it can be operated continuously for several hours with a single pumping.

The burner is constructed to minimize carbonization, all passageways being readily accessible and easily cleaned.

These burners have been in daily service for several years without a single repair.

CONSTRUCTION

Tank is made of steel, all seams welded and brazed, tinned inside and out. Fittings and valves are of best composition metal.

Pump is quick acting, long stroke, with automatic spring check valve, heavy brass, 2" diameter, built inside of tank.

Burner Nozzle is of special heat-resisting metal; passageways are provided with screw plugs for easy cleaning. Vaporizes any grade of kerosene or coal oil, produces an intense reddish blue flame which is steady, clean and without smoke or soot.

Hauck special oil-resisting interwoven hose.

Stands, holding burner, are extra and furnished only when ordered.



FIG. 1151

SHOWS 7A HAUCK "ONE MAN" OUTFIT

No.	Capacity of Steel Hand Pump Tank	One Length of Oil Hose	Oil Consumption per Hour	Length Full Flame Inches	Weight of Burner	Shipping Weight	Price Complete
11	3 gal.	6 ft.	½ gal.	18	.....	50 lbs.	\$ 43.00
7a	5 gal.	6 ft.	1 gal.	22	3 lbs.	60 lbs.	66.25
7	10 gal.	12 ft.	1½ gal.	22	5 lbs.	80 lbs.	91.25
8	12 gal.	12 ft.	2½ gal.	28	6 lbs.	95 lbs.	110.00
9	15 gal.	12 ft.	3 gal.	33	8 lbs.	110 lbs.	126.25

HAUCK TORCH WITH FURNACE

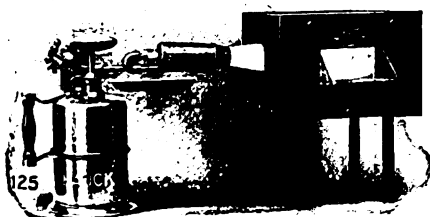


FIG. 1182

No. 14 Hauck welded steel kerosene torch, with heating furnace.

This furnace is especially adapted for heating, soldering irons, light blacksmithing, tool dressing, annealing, hardening, rivet heating and similar heating operations.

Furnace is 10" long, 10" wide and 7" high, lined with fire brick. The opening is 4" wide, 2" high.

Price for Furnace and No. 14 Torch, complete..... \$37.50

Price for furnace separate..... 16.30

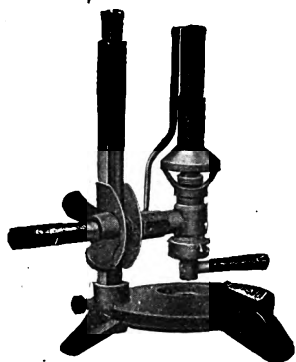


FIG. 1173

JOHNSON HANDY BUNSEN

NO. 3

FOR LIGHT PATTERN MAKING, LABORATORIES, DOCTORS, DENTISTS, STUDENTS

Produces a small, hot blast for light heating purposes. Burner is adjustable to any angle, or can be used as a hand torch. Has pilot light.

Height, 7 inches.

Gas consumption, 5 cu. ft. an hour.

Price, as shown.....

Cast top extra.....

\$6.25

.75

JOHNSON AUTO-BLAST BURNERS

"Auto" means "self," therefore Johnson Burners are self-blast. They secure high efficiency without the use of power or air blower.

These types and various sizes of Johnson Burners give a wide range of usefulness. They may be used singly, or mounted in gangs for use under soft metal melting pots, candy cooking kettles, lard, soda or other caldrons. Information concerning installations will be furnished free upon request.

No. 5.	Type A—capacity 12 cu. ft.....	\$4.40
No. 18.	Type A—capacity 25 cu. ft.....	4.40
No. 7.	Type B—capacity 12 cu. ft.....	3.20
No. 9.	Type B—capacity 25 cu. ft.....	3.20
No. 11.	Type B—capacity 5 cu. ft.....	1.90

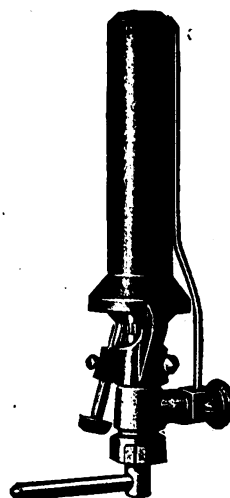


FIG. 1174
TYPE A
WITH SHUT OFF VALVE



FIG. 1175
TYPE B
PLAIN

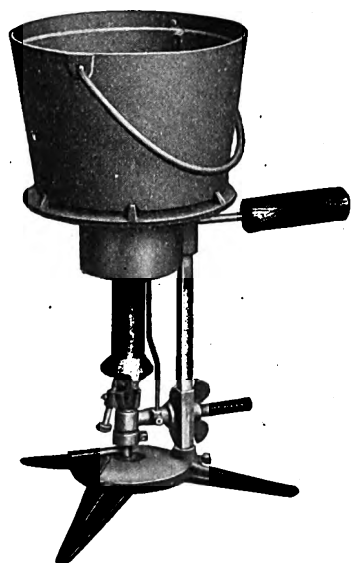


FIG. 1176

JOHNSON ADJUSTABLE TORCH

NO. 8

NO FORCED AIR BLAST REQUIRED

For plumbers, tin, lock, or gun-smiths, pattern makers, electrotypers and metal workers.

For melting soft metals, heating the points of tools for hardening or annealing. Burner is adjustable to any angle or may be removed from base and used as a hand torch. A very handy all-around gas torch. Has pilot light.

Height, 14 inches.

Base, 10 inches.

Weight, 10 pounds.

Gas consumption, 25 cu. ft. an hour.

Price.....

\$9.45

JOHNSON BENCH FURNACES

Are most economical and efficient because they are especially designed for the purpose. The shape of the hood and the angle at which the burners enter the fire-box causes a return blast over the work, insuring uniform heating. The shelf in the rear of the chamber affords a rest for the points of the coppers, and protects their points from the direct flame, so the tinning does not readily burn off.

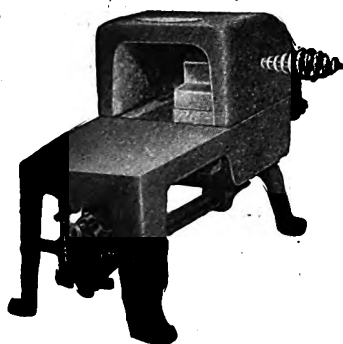


FIG. 1170

NO. 1

FOR HEATING SOLDERING COPPERS OR LIGHT
HEAT-TREATING PURPOSES

Will efficiently handle soldering irons up to 6 pounds a pair. It is equipped with one powerful burner and is capable of producing 1600 to 1800 degrees F. in the fire-box.

Length, 12 inches.

Depth of firepot, $4\frac{1}{4}$ ".

Weight, 12 pounds.

Has pilot light.

Firepot opening, $3\frac{1}{2}$ "x $2\frac{1}{2}$ ".

Gas consumption, 12 cu. ft. an hr.

Price..... \$12.50

NO. 101

FOR FACTORIES, TINNERS, MACHINISTS, GARAGES, JOHNSON
GAS APPLIANCES ARE UNEQUALLED

For heating soldering coppers, capping steels, branding stencils, for case-hardening, annealing or tempering. Unequalled for factories, sheet metal works, machinists and others.

The No. 101 is equipped with two powerful burners, and will quickly and easily handle a pair of 10-pound soldering coppers. It will heat-treat many small tools or carbon steel parts that would otherwise require a blast furnace or forge. Obtains 1600 to 1800 degrees F. in chamber.

Length, 14 inches.

Firepot opening, $4\frac{1}{2}$ "x $2\frac{3}{4}$ ".

Weight, 18 pounds.

Depth of firepot, $5\frac{1}{2}$ inches.

Height, $7\frac{1}{2}$ inches.

Has pilot light.

Price..... \$15.50

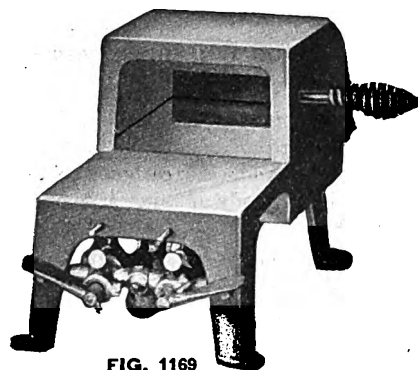


FIG. 1169

NO. 108

Efficient for heat-treating of any carbon steel tool or metal parts within its capacity. The work rest block, furnished with the furnace, affords a rest for the work, while the faced baffle plate partially closes the mouth of the furnace. These, together with the angle of burners and the curved shape of the hood secure uniform results. Gas consumption, 40 cubic feet an hour.

Length, inches..... 16

Height, inches..... $9\frac{1}{2}$

Size of Supply Pipe, inches..... $\frac{1}{2}$

Weight, pounds..... 43

Price, each..... \$29.00

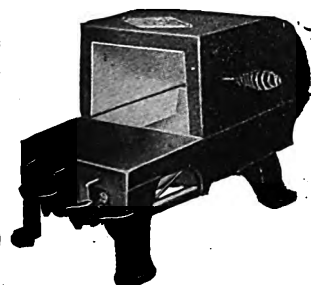


FIG. 4051

NO. 118

For heat-treating of any carbon steel tool within its capacity. Heating of long rods is permitted by opening of the side doors on the hood. The lid may be removed and a 20-pound capacity melting pot be inserted, for the melting of soft metals. Holds melting pot of 6-inch diameter.

Length, inches..... 16

Height, inches..... $9\frac{1}{2}$

Size of Supply Pipe, inches..... $\frac{1}{2}$

Door inside of Hood, inches..... $2\frac{3}{4}$ x $2\frac{3}{4}$

Price, each..... \$31.75

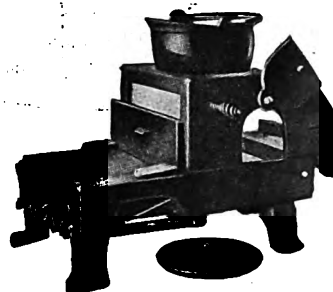


FIG. 4052

THE SUPERIOR SOLDERING FURNACE

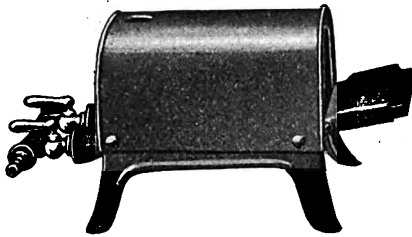


FIG. 1172

Burns natural or manufactured gas. Nozzles furnished for both with each furnace. Each furnace is arranged for gas connection either by hose or pipe and each mixing valve is provided with two feeding nozzles—one suitable for natural gas and the other for manufactured gas.

These nozzles deliver the exact amount of fuel to the burner to produce a hot blue flame without the necessity of adjusting the gas valves. By loosening one screw the valves and nozzles may be removed for inspection and cleaning. The tops and hearths of furnaces are reversible to permit of heating from either end.

	Price
No. 1. Single Burner, with Cast Iron Top.....	\$3.00
No. 2. Double Burner, with Cast Iron Top.....	4.00
No. 3. Single Burner, with Firebrick.....	4.00
No. 4. Double Burner, with Firebrick.....	5.00
No. 5. Double Burner, with Firebrick.....	9.00

JOHNSON BENCH FURNACE

NO. 102

FOR TEMPERING, CASE-HARDENING OR ANNEALING CHISELS, DRILLS, REAMERS AND LATHE TOOLS

For machinists, factories, repair shops. Takes the place of the slow or troublesome forge for many light heating purposes. Will properly handle any carbon steel metal part or piece within its capacity. Easily obtains a temperature of 1600 to 1800 degrees F.

Weight, 35 pounds.

Total length, 28 inches.

Has pilot light.

Dimensions of chamber, 12" long, 4" wide, 3" deep.

Gas consumption, 30 cu. ft. an hour.

Price..... \$23.00

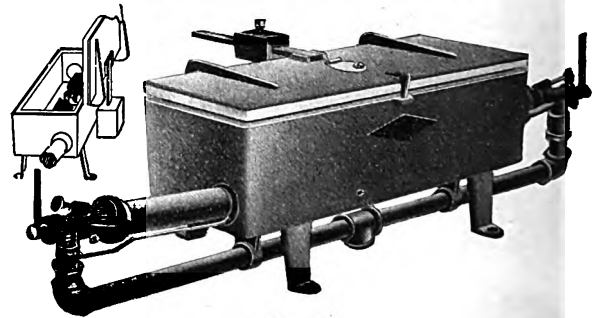
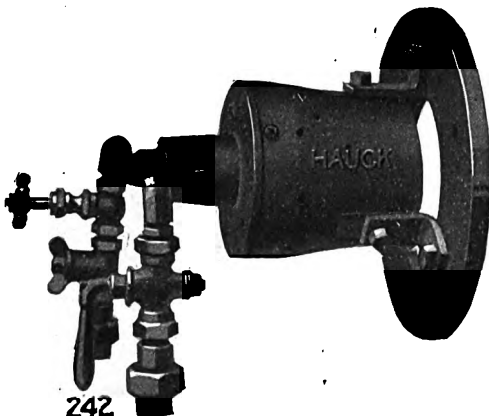


FIG. 1171

HAUCK PATENT FURNACE BURNERS

HIGH PRESSURE OIL BURNER

FOR CORE OVENS, ANNEALING AND PREHEATING OVENS, CRUCIBLE MELTING FURNACES, ETC.



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FIG. 4053

Atomize crude, fuel or kerosene oil with steam or compressed air at 20 to 100 pounds pressure.

Flame lights instantly without preheating, generates complete combustion within the burner.

Produces clean, powerful heat, without spitting or wasting of oil. Instant regulation, uniform distribution. No smoke, soot or gases. Burner is mounted on flange with proper space allowance for natural suction draft.

No.	Oil Consumption per Hour	Air Consumption (Free Air) or Steam per Minute	Price
2F	6-10 gal.	15 cu. ft.	\$40.00
4F	3-6 gal.	12 cu. ft.	30.00
5F	1-3 gal.	8 cu. ft.	28.00

VULCAN AUTOMATIC VACUUM FUEL OIL SYSTEM

The Vulcan Vacuum Fuel Oil System consists of either the Vulcan Standard or Automatic Type Burner, fuel storage tank, and a very simple piping arrangement for oil and steam connections to the burner. No pumps, receivers or auxiliaries common to other fuel oil systems are required. The steam used for atomizing the oil passing through the burner creates a partial vacuum within the suction line leading from the oil supply to the burner. The partial vacuum thus created draws the oil into the burner, from whence it is carried through the burner at high velocity and is thoroughly atomized before passing into the furnace. Both Standard and Automatic Type Burners are constructed throughout of the highest grade phosphor-bronze and machinery brass. Bodies of burners and regulators are rough finished; all connections are highly polished. With every Vulcan Burner is furnished complete detailed and illustrated printed instructions for installation and operation of the system. These are the ideal systems for all oil burning steam plants carrying high or medium steam pressure.

VULCAN AUTOMATIC

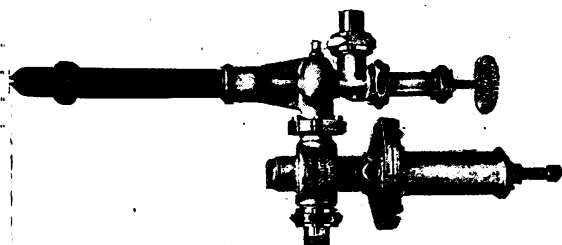


FIG. 4054

The Vulcan Automatic Type Burner is intended for use in stationary plants of every description where conditions require that a constant steam pressure be maintained. Capacity, 50 H.P. to 100 H.P.

VULCAN STANDARD

The Vulcan Standard Type Burner is extensively used in laundries, creameries, packing houses, irrigation plants, etc., and for all classes of contractors' steam operated equipment. Capacity 0 to 100 H.P.

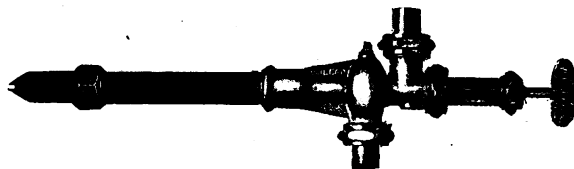


FIG. 4056

WHEN ORDERING IT IS IMPORTANT THAT THE FOLLOWING INFORMATION BE FURNISHED:

Type of boiler. Size and horsepower of boiler. Is boiler overloaded? Steam pressure. Is oil tank above or below level of grates? Vertical distance from bottom of oil storage tank to level of grates; size of oil storage tank; horizontal distance from oil storage tank to boiler.

Prices upon application.

ACME GRAVITY CRUDE OIL BURNERS

STEAM ATOMIZING FOR THE CONTRACTOR

The Acme Gravity Crude Oil Burners are of the outside mixing type and are recommended for use in connection with boilers of any type and for either steady or widely varying loads.

Burners are made in two types and are readily adaptable to any conditions where crude oil may be used as fuel.

The burner bodies are made of best composition metal. Tips are made of close grain gray iron to withstand high furnace temperatures. All parts of burners are accurately machined to standard gauges.

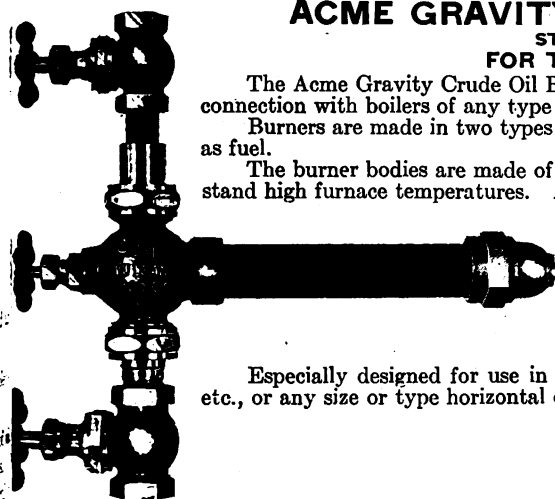


FIG. 4056

TYPE A

Especially designed for use in connection with hoisting engines, pile drivers, locomotive cranes, pavers, etc., or any size or type horizontal or vertical type boilers.

TYPE B

Especially designed for use on Road Rollers, Locomotive engines, etc., where type of boiler or furnace arrangement makes necessary to locate burner at some distance from control valves. Prices upon application.

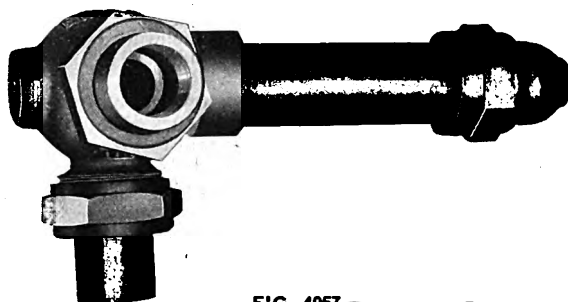


FIG. 4057

PHOENIX GASOLINE TORCHES

CAST METAL CONTAINER—SAFE, SIMPLE AND STRONG



NOS. 2 AND 3—FIG. 1198

The Phoenix Pumpless Torch is made and operated entirely without a pump of any kind, thus eliminating one of the greatest objections and annoyances connected with gasoline torches. The Phoenix Torch has not only the advantage of being pumpless, but is also seamless and without a soldered or brazed joint of any kind.

The body is made entirely of one piece of special alloy and is positively non-leakable and safe. The Burner, or nozzle, is made of extra heavy Bronze Alloy, well finished with large-sized brass stuffing box, extra heavy stem for needle valve, with large fiber wheel (never get hot). The seat of the needle valve is so constructed that it is impossible to crowd the needle into the orifice. The needle seat is interchangeable and can be easily removed if broken.

Has no loose parts to get out of order. No washers or gaskets to be renewed. The material used in the construction of these torches is of the best quality and the workmanship is the highest class mechanical skill. Each detail connected with the construction is given the utmost care.



NO. 4—FIG. 1199

NO. 2 TORCH

This is a handy size Torch which for efficiency on light or heavy work can always be depended upon. Will give 2500 degrees of heat.

NO. 3 TORCH

This is a popular size Torch suitable for all branches of the mechanical trade. Will give 2500 degrees of heat.

NO. 4 FLAT AUTO TORCH

Although this Torch was designed for the automobile trade it has become very popular with all classes of mechanics. The container being flat makes it very convenient for tool cases. Will give 2500 degrees of heat.

Number.....	2	3	4
Capacity, gasoline, pts.....	$\frac{3}{4}$	$1\frac{1}{2}$	1
Will burn, hours.....	$1\frac{1}{4}$	$1\frac{3}{4}$	$1\frac{1}{2}$
Diam. inches.....	3	4	.....
Width, inches.....	.....	.....	$4\frac{1}{2}$
Thickness, inches.....	.....	.....	2
Height, inches.....	$6\frac{1}{2}$	$7\frac{3}{4}$	7
Weight, pounds.....	2	3	2
Price, each.....	\$6.00	\$7.00	\$7.00

BRASS BLOW-PIPES FOR GAS

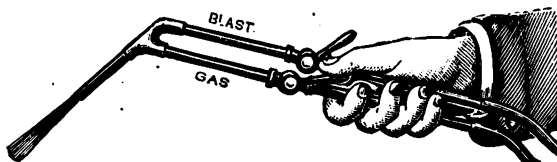


FIG. 1168

These blow-pipes are extensively used by toolmakers, machinists, etc., for annealing, heating tools, hardening and brazing articles that require great heating power. Quick operation, convenient and economical. Furnished with lever stop cocks. No. 8G is designed for natural or artificial gas. Nos. 8C and 8E can also be supplied for natural gas.

Number.....	8B	8C	8E	8F
Bore, inches.....	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{4}$	$\frac{1}{4}$
Length, inches.....	$11\frac{1}{2}$	$13\frac{1}{2}$	14	$14\frac{1}{2}$
Price, each.....	\$3.50	\$5.00	\$8.50	\$11.00

HAUCK KEROSENE FURNACES

FOR ROOFERS, CONTRACTORS, PLUMBERS, ELECTRICIANS, TELEPHONE AND TELEGRAPH COMPANIES

This Furnace has a combination shield for holding metal pots and soldering irons. Tank is made of steel, tinned inside and outside, all seams and fittings are welded, not soldered; will stand rough usage.

Pump is 1 inch diameter, quick acting, automatic check.

Burner furnaces equipped with Hauck Patent Burner, which is bronze, standard threads.

Furnace Shield is detachable so that furnace can be used for heating different sizes of pots, pails and kettles; for melting and heating lead, babbitt, metal, asphalt, liquids, etc.

Soldering irons up to 9 pounds are heated in less time and at lower cost than with gas, gasoline or charcoal.

Furnaces are well balanced with especially wide tanks.

May be operated with gasoline if preferred.

Small Iron pots of 15 to 50 pounds capacity furnished when ordered.

Price, each.....\$16.00

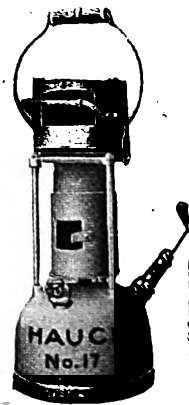


FIG. 4058

C. & L. TORCHES AND FIRE POTS

FOR GASOLINE

THE NO. 32 TORCH HAS NO EQUAL WHERE INTENSE HEAT IS DESIRED. Produces a perfect blue flame indoors or out, in hard wind or extreme cold. Burner is improved type, with special generator chamber, super-heating the gas before it is burned, and is made of special bronze metal which holds the heat and has a hook and support for holding soldering copper. Tank is heavy gauge seamless drawn brass, fitted with patented automatic brass air pump.

Capacity: One Quart. Weight $4\frac{1}{4}$ lbs.
Price each.....\$16.00

The No. 31 Torch is exactly like No. 32 except that it has no hook and support to hold soldering copper. Capacity: One Quart. Weight $4\frac{1}{4}$ lbs.
Price each.....\$15.20

The No. 38 is the best pint size Torch made. An improved burner, shielding the gas from wind and producing a steady blue flame, is made of special generator metal which holds the heat longer, and if fitted with hook and support to hold soldering copper.

Capacity: One Pint. Shipping weight $2\frac{3}{4}$ lbs.
Price each.....\$14.40

The No. 37 Torch is exactly the same as the No. 38, except that it is not fitted with hook and support on the burner to hold a soldering copper. Capacity: One Pint. Weight $2\frac{3}{4}$ lbs.
Price each.....\$13.60

The No. 108 Torch is fitted with a hook and support on the burner to hold a soldering copper. This Torch will not produce as much heat nor do the work the better grade Torches will do, but it is well worth the cost, and is offered to fill an occasional call for a low priced quart Torch.

Capacity: One Quart. Weight 4 lbs.
Price each.....\$15.20

The No. 107 is exactly like No. 108, but is not fitted with hook and support on the burner for holding a soldering copper.

Capacity: One Quart. Weight 4 lbs.
Price each.....\$14.40

The No. 120 is a good quart gasoline Torch, full size, at a close price. While not as powerful as any one of the C. & L. high grade Torches, for medium and ordinary work, good results will be obtained. The pump is fitted with double spring check valve. The No. 120 is supplied with detachable soldering copper attachment without additional charge.

Capacity: One Quart. Weight 4 lbs.
Price each.....\$13.60

The No. 122 is the same as No. 120, except pint size. It is supplied with detachable hook and support without added charge.

Capacity: One Pint. Weight 3 lbs.
Price each.....\$12.00



NO. 32 TORCH
FIG. 1183



NO. 38 TORCH
FIG. 1184



NO. 108 TORCH
FIG. 1185



NO. 120 TORCH
FIG. 1186



NO. 48 TORCH
FIG. 1187

The No. 48 is oblong, $1\frac{1}{8}$ inches thick, and has hook and support to hold soldering copper. Hinged supports at the base prevent tipping over. Convenient to carry as it can be packed in a very small space.

Capacity: One Pint. Weight $5\frac{1}{4}$ lbs.
Price each.....\$18.40

The No. 47 is exactly like No. 48 except that it has no hook and support to hold soldering copper.

Capacity: One Pint. Weight $4\frac{3}{8}$ lbs.
Price each.....\$17.60

FIRE POTS

No. 1 Fire Pot is adapted to a greater variety of uses than any other Fire Pot made. Tank is of heavy gauge welded steel, with cushion protection band at the base, making it extra strong and durable and has extra large funnel plug with dust proof cap. Burner is made of special generator metal which holds the heat longer and works perfectly in windy or cold weather. Swiveled burner permits moving the flame up or down. No. 1 will easily heat a pair of 12 lb. coppers and melt a pot of lead or solder at the same time. Capacity: Seven Pints. Weight 11 lbs.
Price each.....\$27.20

The No. 5 Fire Pot is one size smaller than the No. 1. Tank is made of heavy gauge welded steel. Top section accommodates 8 lb. coppers and is removable.

Capacity: Five Pints. Weight $10\frac{1}{4}$ lbs.
Price each.....\$24.80

The No. 71 Fire Pot is Noiseless, Smokeless and Odorless. Has sub-flame for the generator which permits the heating flame to be turned very low when not in use. Burner has double heating surfaces and the gas is super-heated before it is burned, producing intensely hot blue flames, which burn from each side to the center. Heats twelve pound coppers while melting a pot of metal. Tank is made of welded steel.

Capacity: Seven Pints. Weight $14\frac{1}{4}$ lbs.
Price each.....\$27.20

The No. 72 is one size smaller than No. 71. Heats eight pound coppers while melting a pot of metal.

Capacity: Five Pints. Weight $13\frac{1}{2}$ lbs.
Price each.....\$24.80

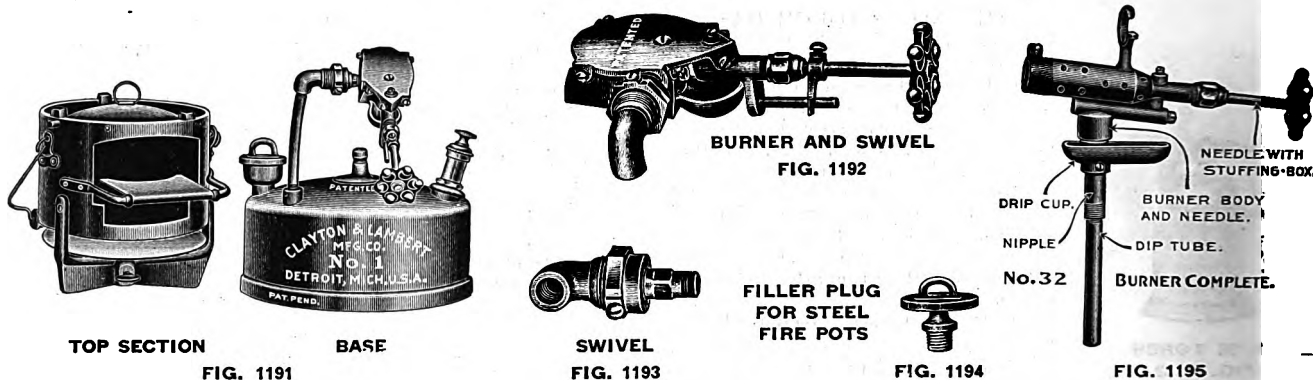


NO. 1 FIRE POT
FIG. 1188



NO. 71 FIRE POT
FIG. 1189

REPAIRS AND EXTRAS FOR C. & L. TORCHES AND FIRE POTS



REPAIR PARTS FOR NOS. 1 AND 5 FIRE POTS LIST PRICE EACH

Fire Pot Number.....	1	5
Base complete with pump, filler plug, burner and swivel, each.....	\$21.20	\$19.20
Top Section.....	9.00	7.20
Burner and swivel.....	8.00	8.00
Pump, complete.....	2.60	2.60
Swivel.....	2.00	2.00
Feed Pipe.....	.40	.40
Filler Plug.....	1.50	1.50

EXTRA REPAIR PARTS FOR NOS. 71 AND 72 FIRE POTS

No.	1	Wheel Handle, Needle, Stuffing Box, Generator and Slide.....	List Price Each
"	2	Generator Pipe, 1/4 in. and Elbow 1/4 in. x 1/8 in....	\$4.00 .80
"	3	Feed Pipe 1/8 in. and Nut.....	1.60
"	4	Pump.....	2.60

No.	5	Pump Collar.....	List Price Each
"	6	Flame Plate.....	\$0.30 .40
"	7B	Filler Plug.....	1.50
"	8	Filler Plug Collar.....	.30
"	9	Filler Plug Washer.....	.10
"	10	Bail Handle.....	.50
"	11	Hood Cover No. 71.....	1.00
"	11B	Hood Cover No. 72.....	1.00
"	12	Spider.....	2.00
"	13	Hearth Rest.....	1.00
"	14	Hearth Plate.....	2.00
"	15	Burner Plate Tubes and Plugs.....	4.40
"	16	Hood No. 71.....	4.00
"	16B	Hood No. 72.....	3.80
"	17	Slip Nut for Feed Pipe.....	.60
"	18	Generator Wire.....	.20
"	19	Oil Slide.....	.20
"	20	Tank Complete, No. 71.....	14.00
"	20B	Tank Complete, No. 72.....	14.00

GASOLINE TORCH REPAIR PARTS—LIST PRICE EACH

Torch Number	Tank Complete with Pump and Filler Plug	Burner Complete with Needle, Drip Cup, and Dip Tube	Burner Body Complete with Needle, S. B. and Burner Tube	Needle and S. B. with Wheel or Handle	Drip Cup	Burner Tube	Nipple	Dip Tube	Pump Complete	Filler Plug	Filler Collar	Pump Collar	Burner Collar
31	\$9.60	\$7.20	\$5.30	\$1.30	\$1.30	.....	\$0.30	\$0.70	\$2.60	\$0.80	\$0.30	\$0.30	\$0.30
32	9.60	7.50	5.60	1.30	1.30	.....	.30	.70	2.60	.80	.30	.30	.30
37	8.00	7.20	5.30	1.30	1.30	.....	.30	.70	2.60	.80	.30	.30	.30
38	8.00	7.50	5.60	1.30	1.30	.....	.30	.70	2.60	.80	.30	.30	.30
47	12.00	7.20	5.30	1.30	1.30	.....	.30	.70	2.60	.80	.30	.30	.30
48	12.00	7.50	5.60	1.30	1.30	.....	.30	.70	2.60	.80	.30	.30	.30
107	9.60	7.20	5.30	1.30	1.30	\$1.30	.30	.70	2.60	.80	.30	.30	.30
108	9.60	7.50	5.60	1.30	1.30	1.60	.30	.70	2.60	.80	.30	.30	.30
120	9.60	7.50	5.60	1.30	1.30	1.60	.....	.70	2.60	.80	.30	.30	.30
122	8.00	7.50	5.60	1.30	1.30	1.60	.....	.70	2.60	.80	.30	.30	.30

PUMPS FOR C. & L. TORCHES AND FIRE POTS

When ordering repair parts always state the number of Torch or Fire Pot to be used on.

STYLE-B-PUMP



FIG. 1196

Pump Parts	List Price Each	Style A	Style B	Style C	Style D
Knob or Button.....		\$0.20	\$0.20	\$0.20	\$0.20
Pump Plunger Complete.....	1.00	1.00	1.00	1.00	1.00
Pump Bottom.....	1.00	1.00	1.00	1.00	1.00
Pump Cap.....	.20	.20	.20	.20	.20
Barrel.....	1.20	1.20	1.20	1.20	1.20
Round Washer, Metal.....	.10	.10	.10	.10	.10
Flat Leather Washer.....	.10	.10	.10	.10	.10
Slide Complete.....	.50	.50	.50	.50	.50
Hexagon Nut Large.....	.10	.10	.10	.10	.10
Cup Leather Washer.....	.20	.20	.20	.20	.20
Brass Spreader.....	.20	.20	.20	.20	.20
Plunger Nut.....	.10	.10	.10	.10	.10
Hexagon Nipple.....	.50	.50	.50	.50	.50
Leather Washer for Nipple.....	.10	.10	.10	.10	.10
Check Valve Rods (Two).....	.10	.10	.10	.10	.10
Check Valve Cork Seat.....	.10	.10	.10	.10	.10
Check Valve Top Plate.....	.20	.20	.20	.20	.20
Check Valve Springs (Two).....	.10	.10	.10	.10	.10
Check Valve End Plate.....	.20	.20	.20	.20	.20
Check Valve Hexagon Nuts (Two).....	.10	.10	.10	.10	.10
Collar.....	.30	.30	.30	.30	.30
Spring Holder.....	.30	.30	.30	.30	.30
Spring and Cork Valve.....	.30	.30	.30	.30	.30
Complete Pump.....	2.60	2.60	2.60	2.60	2.60

LADLES AND MELTING POTS

THE NEWWAY BOTTOM-POUR SELF-SKIMMING LADLE

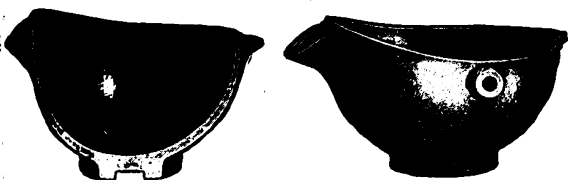


FIG. 1200

Every one familiar with the use and requirements of melting and babbitt ladles will readily understand their merits and advantages over the old style of top-pour ladles. When pouring from the old style ladle it is always necessary that the dross, dirt and other impurities be thoroughly skimmed from the surface of the metal before pouring, or otherwise it will enter the metal and prove injurious to the part poured, while with the bottom-pour ladles it is not only impossible for this accumulation to enter the part poured, but it is better that it remain on the surface as a protection to the metal from oxidation and cooling.

SIZES AND PRICES

Use Number.....	4	5	6	7	8
Capacity, lbs.....	4 1/2	9	18	25	40
Price, each.....	\$2.00	2.00	2.75	2.75	3.35

WROUGHT STEEL LADLE EXTRA DEEP TWO LIPS

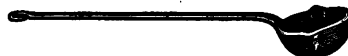


FIG. 1201

Number.....	10	20	30	40	60	80
Size, inches.....	2 1/2	3	3 1/2	4	5	6
List Price.....	\$0.80	1.00	1.10	1.30	2.00	2.40

MELTING POTS



FIG. 1190

Heavy Cast Iron. Of the deep pattern and holds sufficient metal or solder.

Size, inches.....	5	6	8
Price, each.....	\$1.20	1.70	4.40

LEAD SHEET



FIG. 4059

Thickness, in.....	5/128	3/4	7/128	1/8	9/128	5/4	3/2	7/4	1/8	3/4	3/2	1 1/2	1/4	3/8
Weight, per sq. ft., lbs.....	2 1/2	3	3 1/2	4	4 1/2	5	6	7	8	9	10	12	16	24
Price, per Pound.....														

BAR

5 ounce bars. Price per lb.....	About 104 pounds each. Price per lb.....
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PIG

SOLDERING COPPERS



FIG. 1205

These Hand Forged Soldering Coppers are made from pure ingot copper. The handles are forged directly into the end of the copper, by which method the possibility of loose handles is eliminated. The iron handles are smaller than used by most manufacturers, in consequence of which the finished copper contains more copper and less iron than usual.

Weight, pair, lbs. . . .	1/4	1/2	3/4	1	1 1/2	2	2 1/2	3	4	5	6	8	10	12	16
Length, copper, in. . .	2 1/4	2 1/2	2 3/4	2 7/8	3 3/8	3 3/8	4 1/8	4 3/8	4 5/8	5 1/2	6	6 1/4	6 3/4	6 3/4	7 3/4
Length, all, in.	8 3/4	8 3/4	10 1/4	11 1/4	11 1/2	12 1/4	12 3/4	14	14	15	15 1/2	16 3/4	16 3/8	17	17 1/2
Per pound.	\$1.05	\$.85	\$.80	\$.75	\$.70	\$.67	\$.66	\$.65	\$.65	\$.65	\$.65	\$.65	\$.65	\$.65	\$.6

When one only is wanted order as half pair.

VULCAN ELECTRIC SOLDERING TOOLS

The heating unit in Soldering Tools is hermetically sealed so flux fumes cannot destroy it. The peculiar and patented construction forces all the heat to the tip. The tip is made of pure copper, hand-forged and tinned. The one-piece handle unscrews and slides back on the cord, exposing the very convenient terminals. Each tool has a six-foot cord and a separable Edison Bar Plug. The tips screw in and are easily replaced when worn out.



FIG. 1206—NOS. 100 AND 200



FIG. 1207—NOS. 300, 400, 500, AND 700



FIG. 1208—NO. 600



FIG. 1209—NO. 800

- No. 100—Equal to 1 1/2 pounds per pair soldering copper. For telephone switchboards, electrical instruments, very light manufacturing and small fuses.
- No. 200—Equal to 3 pounds per pair soldering copper. For fast telephone work, light tinware, automobile repairs and general home use.
- No. 300—Equal to 4 1/2 pounds per pair soldering copper. For medium tinware, general manufacturing, metal patterns, general automobile work and "tipping" in canneries.
- No. 400—Equal to 6 pounds per pair soldering copper. For heavy tinware, sheet steel work, metal boat making, refrigerator work and automobile work.
- No. 500—Equal to 2 pounds per pair soldering copper. About the same as the No. 200 but recommended when shortness is important.
- No. 600—Equal to 1 pound per pair soldering copper. For extremely light soldering light telephone, multiple switchboard repairs, electrical instruments and the smallest fuses.
- No. 700—Equal to 1 1/2 pounds per pair soldering copper. For bench and open work where light short tip is wanted. Specially adapted for telephone inspector or lineman's tool kit.
- No. 800—Equal to 10 pounds per pair soldering copper. For very heavy metal patterns, copper cornice work, heavy sheet metal work, automobile radiator work and all kinds of heavy soldering.

SPECIFICATIONS AND PRICES

Number	100	200	300	400	500	600	700	800
Watts Consumed	70	150	250	350	120	55	60	500
Total Length, in.	13 3/4	14 1/2	14 3/4	14 3/4	11 3/8	13 3/4	10	15 1/2
Total Weight, oz.	12	18	29	46	16	9	9	65
Diam. of Tip, in.	1/2	7/8	1 1/8	1 3/8	7/8	7/8	1 1/2	1 3/4
Price, each.	\$7.00	\$9.25	\$11.50	\$13.50	\$8.00	\$6.50	\$6.50	\$18.00
Additional Tips. . . . .	.40	.65	1.15	1.35	.60	.35	.35	2.40

CAN CAPPING TOOL

Constructed with a circular tip the same diameter as the cap to be soldered. A spring plunger is provided to hold the cap down while the solder sets.

These tools may also be applied to power capping machinery, in which case the make of the machine must be specified.

When ordering send a sample of the cap to be used as the tip must be exactly the same diameter.

The standard No. 300 Soldering Tool is recommended for "tipping" in connection with the capping tool for sealing cans.

No. 402 Consuming 350 watts, each. \$18.00

Additional Tips. Price depends on size.



FIG. 1211

FIG. 1210
VULCAN

SOLDERING COPPER HANDLES

Plain hardwood. Natural finish, with wired shank. Diameter, 1 inches. Length 5 1/4 inches. Weight per dozen, 3 lbs.

Price per dozen. \$0.

Also see "Skroo-zon" Handle, page 304.

BABBITT METAL OUR CELEBRATED BEAR BRANDS



FIG. 1202

GOVERNMENT GENUINE

This metal is recommended for use on all high-class machinery, automobiles, stationary engines, locomotives, sugar centrifugals, electrical bearings, etc.

For all particular work this makes one of the best alloys possible for the metal maker to produce. It is extremely hard and tough. Has a low frictional co-efficient and for heavy work the only superior to it is the aluminum nickel.

Price, per pound.....

GOLDEN GATE

This class of babbitt metal gives good results as an all round repair metal for planing mills, rolls, in mining mills, crank pins and general purposes. Handles high speed work very well as its frictional co-efficient is low.

Price, per pound.....

XXXX NICKEL

A strictly tin base metal, especially adapted for high speed and heavy pressure bearings.

Price per pound.....

ALUMINUM NICKEL

This metal will meet all the conditions mentioned and is the most resistant metal manufactured. It is especially adapted for automobiles, rock crushers, street car bearings, coal disintegrators, or stamp mills and all conditions where they are carrying a heavy load working in dust and grit. It will cut less and create less friction and its tensile strength, through having the iron, etc., eliminated, is more than double that of any other metal.

Price, per pound.....

COPPER HARDENED

This is a general purpose metal and is very popular on the Pacific Coast. It is adapted for use in instances where something better than lead base metal is required. It is a strictly durable good metal.

Price, per pound.....

WHITE BRASS

Price, per pound.....

SOLDER

BAR—HALF AND HALF

Genuine Half and Half, per pound.....

WIRE

Genuine Half and Half, 1/8-inch diameter, per pound.....

V STRIP

1/2x24 inches, per pound.....



FIG. 1203

WIPING

Price per pound.....

SILVER

FOR BRAZING BAND SAWS

A good flowing and strong solder.

Widths ..	1/2, 5/8, 3/4	7/8	1 inch
Thickness	.002	.003	.004 inch

Price per ounce.....

Put up in one ounce boxes.

BRAZING SPELTER

FOR BRAZING BRASS, COPPER AND STEEL



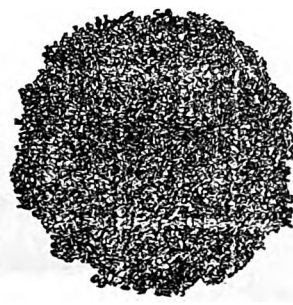
NO. 21



NO. 22



NO. 23



NO. 26

No.	Per Pound	No.	Per Pound
21—Medium Long Grain.....	.....	26—Extra Fine Round Grain.....	.....
22—Fine Long Grain.....	.....	Twenty-five Pounds in a Tin Can.	.....
23—Extra Fine Long Grain.....	.....	Wire Spelter.....	.....

FIG. 1204

OXY-ACETYLENE WELDING SUPPLIES

We carry a complete stock of welding supplies and accessories, such as rods and fluxes for all metals, hose, fittings, goggles, trucks, etc.

The use of proper welding rods and fluxes is necessary for good welding. Imperial rods for cast iron, steel, brass, aluminum, etc., and fluxes for different metals are made to formula and contain elements which assist very materially in the production of high grade welds.

For welding metal that is $\frac{1}{8}$ " or less in thickness, use welding rod $\frac{1}{8}$ " in diameter, while for welding metal $\frac{1}{8}$ " to $\frac{5}{8}$ " thick, the $\frac{1}{4}$ " rod should be used. By using only high grade rod of the proper size and keeping it in contact with the weld, hard spots and cold shuts can be prevented.

WELDING RODS

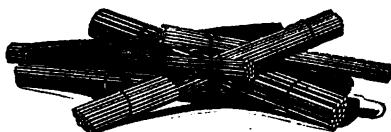


FIG. 1164

PRICES ON APPLICATION

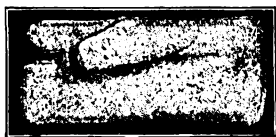
	Length
Cast Iron— $\frac{1}{8}$ ", $\frac{1}{4}$ ", $\frac{5}{16}$ ", $\frac{3}{8}$ ", $\frac{1}{2}$ " diameter.....	18 inches
Norway Iron— $\frac{1}{8}$ ", $\frac{3}{16}$ ", $\frac{1}{4}$ ", $\frac{5}{16}$ ", $\frac{3}{8}$ ", $\frac{1}{2}$ " diameter.....	36 inches
Mild Steel— $\frac{1}{8}$ ", $\frac{1}{4}$ " diameter.....	18 inches
Nickel Steel— $\frac{1}{4}$ " diameter.....	36 inches
Vanadium Steel— $\frac{1}{4}$ " diameter.....	36 inches
Tobin Bronze— $\frac{1}{8}$ ", $\frac{1}{4}$ " diameter.....	18 inches
Imperial Cast Bronze— $\frac{1}{4}$ " dia., for welding mall. iron.....	18 inches
Imperial Cast Brass— $\frac{1}{4}$ " dia., for welding brass.....	18 inches
Drawn Aluminum— $\frac{1}{4}$ " diameter.....	18 inches
Cast Aluminum— $\frac{1}{4}$ " diameter.....	18 inches

WELDING WIRE

PRICES ON APPLICATION

	Approximate Weight
Norway Iron Welding Wire— $\frac{1}{8}$ ", $\frac{1}{8}$ ", $\frac{3}{16}$ " diameter.....	per coil 55 to 100 lbs.
Mild Steel Welding Wire— $\frac{1}{8}$ ", $\frac{1}{8}$ ", $\frac{1}{4}$ " diameter.....	per coil 50 to 100 lbs.
Brass Welding and Brazing Wire— $\frac{1}{8}$ ", $\frac{1}{8}$ " diameter.....	per coil 50 to 60 lbs.

ASBESTOS WELDING AND CUTTING GLOVE



NO. 56-H—FIG. 1165

Strong and serviceable—made from high grade asbestos cloth with fleece lining. Affords maximum protection against heat and is absolutely fireproof.

No. 56-H Asbestos Glove with one finger.....per pair \$4.00

SPARK LIGHTER



NO. 59-H—FIG. 1166

Furnishes a convenient means of lighting welding and cutting torches without danger of burning fingers.

Each..... \$0.25

WELDING AND CUTTING HOSE

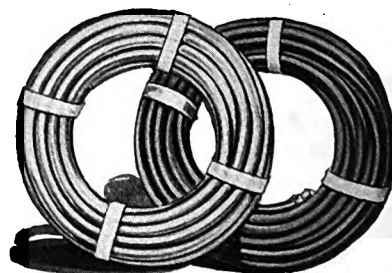


FIG. 1167

Our Hose is made especially for oxygen and hydrogen or for acetylene and has a braided linen insertion between an inner and outer seamless rubber tube. The manufacturers guarantee this hose to stand a working pressure of 400 lbs. per square inch, and while light and very flexible, tests show unexcelled durability. The interchangeable union hose connections for attaching to torch and regulators are cemented into hose and clamped, eliminating all chances for gas leakage.

No. 10-H	Black, oxygen; 25-ft. length, for cutting, per ft.	.....
No. 11-H	Red, acetylene; 25-ft. length, for cutting.....	per ft.
No. 14-H	Black, oxygen; 12½-ft. length, for welding.....	per ft.
No. 15-H	Red, acetylene; 12½-ft. length, for welding.....	per ft.
No. 17-H	Copper armored hose; 25-ft. length, for cutting.....	per ft.

Other lengths when desired.

Prices on application.

BRAZING AND WELDING SUPPLIES

BRASS BRAZING WIRE



FIG. 1212

Smooth Wire.

Gauge	No.	Approx. ft. to 1 lb.	Pound
	6	16 Ft.....	.....
	8	20 ".....	.....
	12	27 ".....	.....

SUPERIOR BRAZING COMPOUND



FIG. 1217

As this compound is stronger than borax, boric acid or a mixture of both, a much smaller quantity only is necessary to do the work.

As a rule one quarter as much (compared with other fluxes) is all that is needed, any greater amount used being wasted.

The contents of the package has been tested in actual work, and if used according to directions is absolutely guaranteed to give uniformly perfect results.

1 pound package.....	\$0.50
5 " " ".....	2.50

CLIMAX WELDING COMPOUND



FIG. 1215

A compound designed to be applied between the lap. It causes the steel to weld like iron. Has no equal for tires, axles, springs and all general welding.

Welds steel at the lowest possible heat.

5 Pound Boxes, Price.....	per pound	\$0.28
10 " " ".....	"	.28
25 " " ".....	"	.26½
50 " " ".....	"	.26½
100 " " ".....	"	.26
150 " Kegs ".....	"	.....

E-Z WELDING COMPOUND

For Welding all grades of steel.

5 Pound Boxes, Price.....	per pound	\$0.28
25 " " ".....	"	.26½
50 " " ".....	"	.26½
100 " Drums, ".....	"	.26



FIG. 1213

BORAX-ETTE WELDING COMPOUND



FIG. 1214

For welding all grades of steel, especially adapted for plow work.

5 Pound Boxes, Price.....	per pound	\$0.28
25 " " ".....	"	.26½
100 " " ".....	"	.26

CHERRY HEAT WELDING COMPOUND



And MALLEABLE Iron to Steel.

FIG. 1218

The best flux known for welding. Iron to iron, Steel to steel, and Malleable Iron to Steel.

5 Pound Boxes, Price.....	per pound	\$0.28
25 " " ".....	"	.26½
100 " Boxes, ".....	"	.26
300 " Half-barrel, Price.....	"	.....
600 " Barrels, Price.....	"	.....

WELDING AND SOLDERING SUPPLIES

FLUXALL WELDING COMPOUND

FOR OXY-ACETYLENE WELDING

Made in three grades as follows:

- No. 1—Marvelous for removing impurities in cast and malleable iron. Excludes bubbles, softens the weld. For oxy-acetylene welding only; 11 oz. cans. Price, each..... \$0.50
- No. 2—For welding or brazing of brass, copper or bronze; 11 oz. cans. Price, each..... .50
- No. 3—For blacksmithing or oxy-acetylene welding of bar iron and steel. It sticks to the metal and works at a very low heat, makes smooth and perfect welds; 11 oz. cans. Price, each..... .50



FIG. 4071

BURNLEY SOLDERING PASTE

For all soldering uses, in plumbing work, electrical work and shop work, including the hardest of galvanized iron jobs. Sticks to the job, can't spill or leak, and makes good on every kind of soldering.

2 ounce can, price each.....	\$0.50	1 pound can, price each.....	\$1.80
4 ounce can, " " .....	.70	5 pound can, " "	6.00
8 ounce can, " "	1.10		



FIG. 1219

BURNLEY SOLDERING SALTS

Burnley's Soldering Salts is a combination of pure chemicals designed to supply a first-rate soldering flux to the man who doesn't like a soldering stick or soldering paste. It is the best of its kind. Dissolve one part of the soldering salts in six parts of water and apply with a brush.

½ pound cans, price.....	\$0.30
1 pound cans, " .....	.60

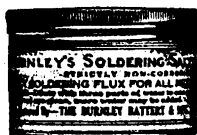


FIG. 1220

BURNLEY SOLDERING STICKS

Rub Burnley's Soldering Stick on the heated joint, then apply the solder and the flame. A solid, flush joint results. The stick is in convenient form and handy to use. An ideal flux for electricians who like to use a stick. Every stick is put up in a separate box and wrapped in tinfoil—it will not corrode the wire nor affect the insulation.

It is hard to break and of course it won't spill!

Size 1" dia. x 5½" long, price each..... \$0.25



FIG. 1221

ALLEN SOLDERING LIQUID

For all flat "straight-away" soldering, as well as surfaces involving small crevices where liquid goes most easily, Allen Soldering Liquid gives best results. It is applied with a brush, a squirt can, a swab-stick or in any other way suitable to the job. It makes positive and sure unions between two pieces of, or a combination of, the following metals: Tin, lead, zinc, copper, brass, cast iron, steel, nickel, galvanized iron, phosphor-bronze, German silver, etc. It contains no acid—has no fumes—will not corrode—is non-poisonous. It is used by large manufacturers in every branch of the metal industry. In its original strength it is especially adapted to galvanized iron or steel. It is diluted several times its bulk for other work, according to requirement. Practically non-evaporating.

5 pound bottles, price, each.....	\$3.10
10 pound cans, price, each.....	5.10



FIG. 4072

BORAX

FIG. 1222

For welding, laundry and preservative purposes.

Borax Crystallized, per pound.....

Average weight, 100 lbs. per sack. In bulk.

SPECO SAL-AMMONIAC

Drop a little solder on the Speco. Rub your iron in it. It will be cleaned and tinned at the same moment. If the iron is very hot, the operation can be done more quickly. It is convenient to keep a little solder in a hollow in the Speco all the time. Speco saves the iron by doing away with repeated filing.
 Price, ½ pound cakes.....
 Price, 1 pound cakes.....

CARPENTERS CHALK

PREPARED. OVAL SHAPE



FIG. 1762

	Price Per Gross
White.....	\$2.50
Red.....	3.00
Blue.....	3.00
Weight per gross about 16 pounds.	

MURIATIC ACID

Muriatic Acid, with zinc in solution, is used as a general flux in soldering and tinning. Zinc is dissolved in Muriatic Acid to a point of saturation, that is, until the acid is filled with dissolved zinc. In all classes of soldering, except tin plate and aluminum soldering, zinc-saturated Muriatic Acid is used where a quantity of soldering is to be done.

Zinc scraps may be obtained from the zinc shell or container of exhausted dry cell batteries by splitting a cell open with a cold chisel and cutting up the zinc container with a pair of snips.

1-lb. bottles, each.....
 6-lb. bottles, each.....

CYANIDE OF POTASSIUM

Used very extensively for case hardening. Generally used in connection with bone dust for hardening steel.

Price, 99 per cent. pure, 5 and 10 lb. cans, per pound.....

SAL-AMMONIAC

Sal-ammoniac (extra quality), price, 5 oz. pkg.....

Sal-ammoniac (extra quality), price per lb. in bbl. lots.....

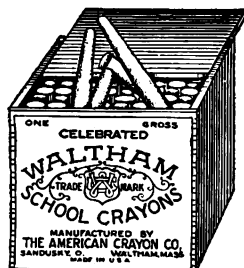
SCHOOL CRAYONS

FIG. 1766

White: Weight per gross about 2½ pounds.

Price, per gross..... \$0.50

LUMP CHALK

White, in lumps, about 300 lbs. in a barrel.

Price, per pound..... \$0.03½

SOAPSTONE CRAYONS

Style.....	*Round	Square
Size, inches.....	5x¼	5x¼x¼
Price, per gross.....	\$4.00	3.50
*Pencils.		

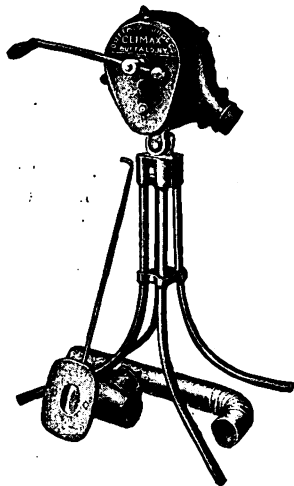


FIG. 1232
CLIMAX BLOWER

BUFFALO FORGES

CLIMAX BLOWER

NO. 700

The gears of the No. 700 Blower are machine cut and consist of two spur gear wheels and two helical gear wheels properly proportioned to drive the fan 1800 revolutions per minute with the crank being turned at a very moderate speed. The gear and fan case are fitted together, forming a compact, light and strong head. The fan case is 12 inches in diameter and is pear-shaped, so that the crank can be turned forward or backward with equally good results. The high speed fan pinion runs in a bath of oil, lubricating all other working parts by splashing. Furnished complete with tuyere and pipe, as shown in cut, mounted on four legs.

SILENT BLOWER

NO. 200

Down to the smallest detail every part has been perfected to give positive insurance against wear, friction, dislocation and breakage. The utmost strength and durability is therefore insured.

When you buy a forge of any size, consider the blower first, last and all the time. It is by far the most important part of any forge.

The scroll-shaped fan design of the Buffalo No. 200 Blower is the result of the latest discoveries in pneumatics, giving blast delivery along the line of least resistance. Turning crank forward you therefore get over 25% more blast than in other blowers—with the same power expended, and by turning crank backward you get a more moderate blast—about the same as in other blowers.

The helical high speed gears used in this blower are the most smoothly running, low-friction gears known—their efficiency and durability being fully 50% greater than any Spur cut and Spiral Worm Gears made. All end thrust is balanced on adjustable ball bearings.

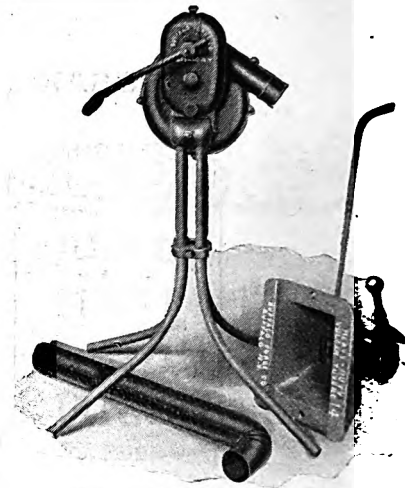


FIG. 1233
NO. 200 SILENT BLOWER

SPECIFICATIONS AND PRICES

Number	Power	Mounting	Diam of fan, In.	Height Inches	T & L Pulley Inches	Without Tuyere or Pipe		With Tuyere and Pipe	
						Weight	Price	Weight	Price
700	Hand	Four Legs	12	48	.....	...	.....	130	.....
200	Hand	Four Legs	14	48	.....	110	.....	165	.....
200	Power	Pedestal	14	49	6x1½	170	.....	200	.....

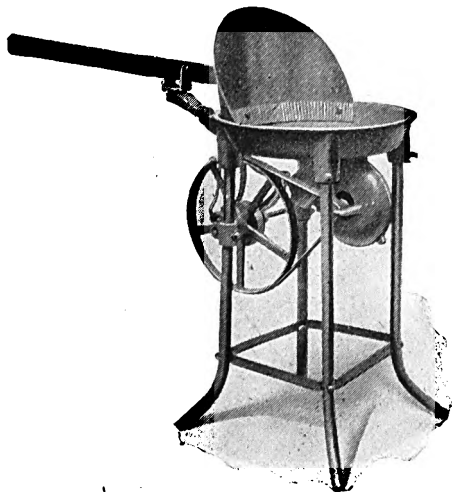


FIG. 1234
NO. 161

AGRICULTURAL

NOS. 161 AND 161-H

These forges are well constructed, with deep and strong hearth, and lever-operated steel fan. Have seamless tube Steel Legs, rigidly braced and screwed into the sockets in the fire pan—No. 161-H is the same as No. 161 except that it has a half-hood instead of a wind-shield.

CLIMAX

NOS. 722 AND 722-H

For use in Garages, Machine Shops and Farms.

These forges are equipped with the Buffalo No. 700 Blower. The hearth is a strong and sound, bowl-shaped casting, supported by four tube-steel legs, rigidly braced. The tuyere plate is round and perforated to give an even spread of blast.



FIG. 1235
NO. 722

SPECIFICATIONS AND PRICES

No.	Diam. of Hearth inches	Diam. of Fan inches	Type Hood	Height Inches	Shipping Weight lbs.	List Price
722	22	10	Windshield	30	145	.....
722-H	22	10	Half-Hood	30	150	.....
161	18	8	Windshield	31	70	.....
161-H	18	8	Half-Hood	31	75	.....

FOR STATIONARY DOWN-DRAFT FORGES SEE INDEX

BUFFALO FORGES

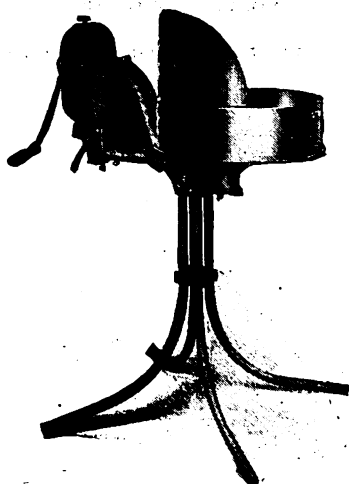
GARAGE AND FARM

NOS. 742 AND 742-H CAST IRON

These forges are offered as low-priced machines designed to fill the needs of the farmer and mechanic who desire up-to-date forges, fitted with crank-operated blower instead of the lever type and having enclosed instead of open gears. This demand is met by the combination of the No. 700 Blower and a large cast iron fire pan with modern pot tuyere iron having revolving clinker-breaking valve and automatic ash gate. They are better forges than ever before offered at the price. Can be furnished with windshield for outdoor work or with half-hood, as shown, for indoors.



NO. 742-H—FIG. 1236

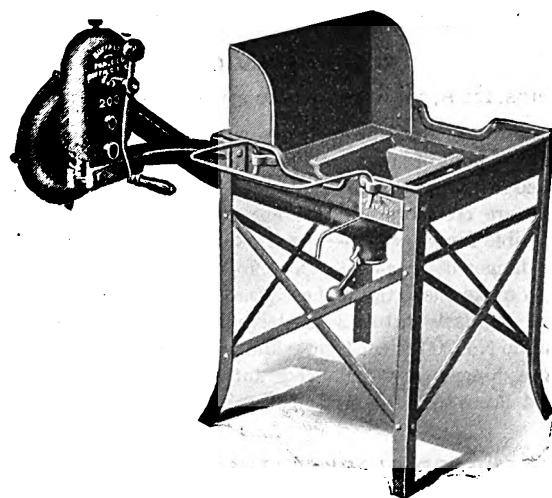


NO. 210—FIG. 1237

RIVET NO. 210

For Railroads, Bridge Builders, Boiler Makers, Ship Builders, Structural Iron Workers and Machine Shops.

Largest capacity. Quickest heats. Easiest operation. Equipped with Buffalo 200 Silent Blower with 12-in. Fan. Crank turns either way producing equal blast. The fire pan is made of heavy, rolled steel plate, strongly riveted. The windshield and blower are detachable and can be packed in the fire pan for transportation. A heavy, round tuyere plate distributes the blast so as to insure the best results in heating. This forge will, therefore, give satisfactory service years after others are worn out.



NOS. 230 AND 231—FIG. 1238

OUTDOOR

NOS. 230 AND 231 STEEL

For contractors, railroads, street car lines, tank and boiler makers, bridge builders, miners and shipbuilders—for outdoor use.

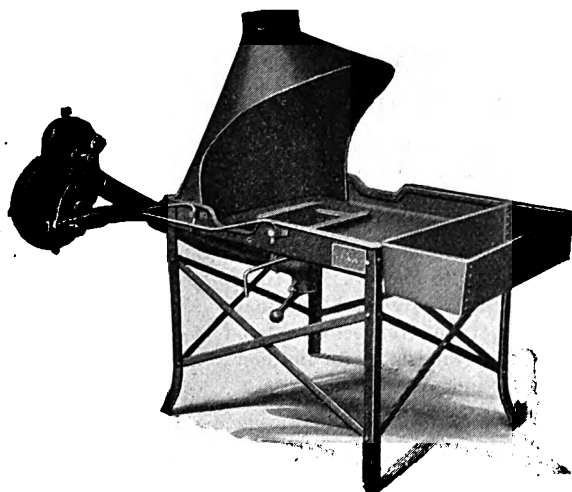
Being of steel plate construction throughout, they combine lightness with the greatest strength. The fire pan is strongly reinforced with angle steel around the edges, and the legs, also made of angle steel, are rigidly cross braced with bar steel. The blower is the 14-inch "Buffalo 200 Silent" with heavy-duty Vulcan tuyere iron.

SPECIFICATIONS AND PRICES

No.	Type Hood	Fire Pan			Size of Hearth inches	Diam. of Fan Case in.	Weight lbs.	List Price	
		Diam in.	Width in.	Length in.				With Water Tank	Without Tank
742	Windshield	....	....	....	23x35	12	205	.....	.....
742H	Half-Hood	....	....	....	23x35	12	215	.....	.....
230	Windshield	....	24	24	....	14	225	.....	.....
231	Windshield	....	30	30	....	14	260	.....	.....
210	Windshield	18	....	....	....	12	115	.....	.....

FOR STATIONARY DOWN-DRAFT FORGES SEE INDEX

BUFFALO FORGES



NOS. 230-H, 231-H, 232-H and 233-H—FIG. 1239

ROUGH SERVICE

NOS. 230-H, 231-H, 232-H, AND 233-H STEEL PLATE

These forges combine lightness with the greatest strength. Fire pans are built of heavy, rolled steel plate, riveted and strongly re-inforced with angle steel around the edges. The angle steel legs are cross-braced with bar steel. These make rigid, indestructible forges, which can be used in the roughest service without danger of breakage. No effort and expense have been spared to make them the highest class forges that can be built. They are regularly fitted with the powerful, easy-running 14-inch Buffalo No. 200 Silent Blower and heavy duty Vulcan Tuyere. Also note hinged and balanced automatic ash gate, which opens and closes by a touch of the foot.

STANDARD BLACKSMITHS' AND SCHOOL

NO. 243-H

Fitted with the powerful, easy-running 14-inch Buffalo No. 200 Silent Blower and Heavy-Duty Vulcan Tuyere. The construction of this forge is the same as the Old Reliable Forge No. 0, thousands of which have been in use for over thirty years and are still doing as good work as ever. This combination makes this forge ideal for all-round blacksmithing and horse-shoeing; has sufficient capacity for doing the heaviest work in the shortest time, at the same time affording easy regulation or smaller fires.



NO. 243-H—FIG. 1240

DOWN-DRAFT—SCHOOL AND GARAGE

NO. 243-E



NO. 243-E—FIG. 1241

Smoke and gases are mechanically removed by the Down-Draft hood. Part of the unconsumed gases are returned to the fire for full combustion, saving coal and keeping the shop clean and healthful. Barring the Down-Draft hood, and other improvements, the design of this forge is the same as the Old Reliable Buffalo Forge No. 0.

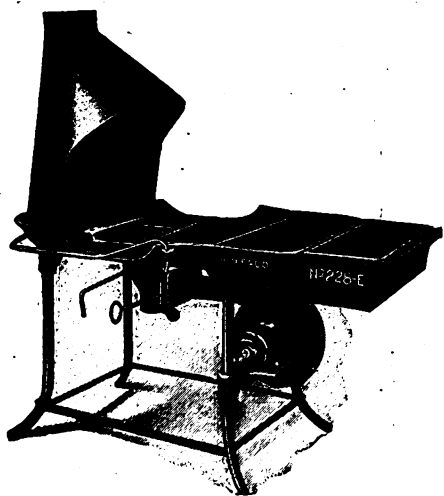
SPECIFICATIONS AND PRICES

No.	Size of Fan inches	Size of Hearth inches	Shipping Weight lbs.	List Prices	
				With Water Tank	Without Water Tank
230H	14	24x24	230	.....	.....
231H	14	30x30	270	.....	.....
232H	14	30x36	310	.....	.....
233H	14	30x40	330	.....	.....
243H	14	28x40	350	.....	.....
243E	14	28x40	615	.....	.....

FOR STATIONARY DOWN-DRAFT FORGES SEE INDEX

BUFFALO ELECTRIC FORGES

EQUIPPED WITH ELECTRIC BLOWER, WIRE AND PLUG. SIMPLY SCREW PLUG INTO LAMP SOCKET TO MAKE CONNECTION



NOS. 844-H AND 847-H—FIG. 1242

HEAVY BLACKSMITHING

NOS. 844-H AND 847-H

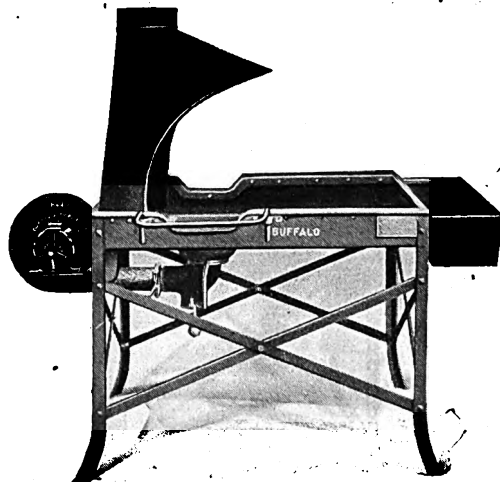
Of ample capacity for heavy blacksmithing; spacious hearth widened out on both sides of the tuyere, and with coal box at one end, cast in the hearth. Equipped with heavy-duty Vulcan tuyere, which gives unequalled heating capacity. Take heaviest iron, up to 12 inches long in one heat, without moving the iron.

The valve is adjustable to a smaller fire, and when turned breaks up clinkers and removes same with the ashes, the clearance being very large. When ordering, please give full particulars about the current and state preference for variable or constant speed blower. The former has six-speed regulator, the latter is furnished with a blast-gate giving perfect control of the blast or fire

ROUGH SERVICE

NOS. 830-H, 831-H, 832-H AND 833-H

Fire pan, tank legs, hood and bracing are of steel, carefully riveted, making forges of the greatest toughness and strength. In ordering, please give full particulars about your current, and state preference for constant speed or variable speed blower. In the former the blast or fire is perfectly controlled by blast gate; with the latter, a six-speed regulator is furnished. Equipped with heavy-duty Vulcan tuyere, the welding capacity of these forges is unequalled.



NOS. 830-H, 831-H, 832-H AND 833-H—FIG. 1243

**GARAGE
NO. 840-H**

NO. 840-H—FIG. 4073

This forge is desirable for garages and general indoor work. Furnished with round tuyere iron with revolving clinker-breaking valve and hinged and balanced ash gate which opens and closes by a touch of the foot.

Equipped with 12 inch No. 200 Silent Blower. Gear ratio $47\frac{1}{2}$ to 1. Cast iron hearth and half-hood, but equipped with No. 2-E variable or constant speed blower.

Be sure when ordering to state preference and give complete information about voltage, current, etc.

A six-speed regulator furnished with every variable speed blower.

SPECIFICATIONS AND PRICES

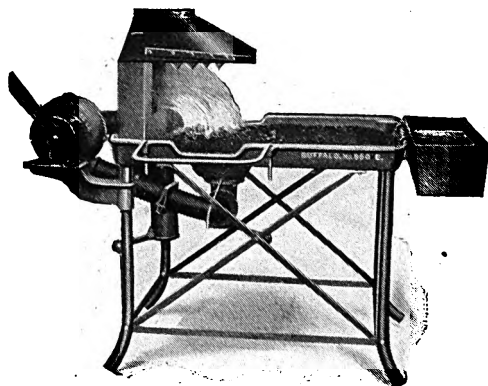
No.	Size of Hearth inches	Approximate Shipping Weight lbs.	List Prices With Variable Speed Blower	List Prices With Constant Speed Blower		Extra for Water Tank
				A.C.	D.C.	
830H	24x24	185	\$ 86.70	\$ 86.70	\$ 86.70	\$ 6.00
831H	30x30	225	96.90	96.90	96.90	6.00
832H	30x36	235	102.00	102.00	102.00	6.00
833H	30x40	255	107.00	107.00	107.00	6.00
840H	25x30	300	.....	.....	.....	.....
*844H	31x44	325	86.70	86.70	86.70	4.80
847H	32x45	365	95.20	95.20	95.20	4.80

*Has no coal box. Above forges shipped without water tank. Specify if same are wanted.
All of the above forges are furnished with variable or constant speed No. 2-E Blower.

BUFFALO DOWN DRAFT ELECTRIC FORGES

EQUIPPED WITH ELECTRIC BLOWER, WIRE AND PLUG. SIMPLY SCREW PLUG INTO LAMP SOCKET TO MAKE CONNECTION

NOS. 843-E, 845-H, 848-E



NO. 843-E—FIG. 1245



NO. 848-E—FIG. 1244

The patent Down-Draft hoods remove smoke and sulphur fumes mechanically, keeping the shop clean and healthful. Part of the unconsumed gases are re-circulated, insuring complete combustion and effecting a considerable saving of coal. Equipped with Electric Blower, you have the choice between Variable Speed with six-speed regulator, and Constant Speed with blast gate regulation. When ordering, please indicate choice of blower and give full details about the current. Nos. 843-E and 845-H equipped with Vulcan Tuyere which takes iron up to 12 inches long in one heat and is just as easily adjusted to the smallest fire. The patent eccentric blast valve, by a few turns, breaks and cleans out clinkers and ashes, which escape through the hinged and balanced automatic ash gate. Legs of heavy, seamless tube steel, rigidly affixed and braced. The No. 848-E is a splendid forge for heavy work and severe service. Equipped with the R R tuyere iron, fully 5 inches deep and 12x14 inches over all. Its revolving ball valve gives close control of the fire and quickly breaks and cleans out clinkers and ashes, which escape through the hinged and balanced ash gate.

SPECIFICATIONS AND PRICES

No.	Size of Heart inches	Approximate Shipping Weight lbs.	List Prices With Variable Speed Blower	List Prices With Constant Speed Blower		Extra for Water Tank
				A.C.	D.C.	
843-E	28x40	475	.....	.....	.....	.....
*845-H	31x44	575	.....	.....	.....	.....
848-E	38x42	600	.....	.....	.....	.....

No. 845-H furnished with either Constant or Variable Speed 2-E Blower. Nos. 843-E and 848-E equipped with 2-EH Constant Speed or Variable Speed Blower. Nos. 845-H and 848-E have coal box.

BUFFALO COMPRESSED AIR FORGES

Operated by compressed air of from 15 to 100 pounds pressure. Perfect regulation of blast obtained by simple needle valve, through which compressed air is supplied. Once the needle valve is adjusted, no further regulation is required.

Compressed air is fed to fire through a specially constructed, three-stage injector. In the first two stages five volumes of outside air are drawn in to each volume of compressed air used. In the third stage the air is thoroughly mixed and reduced to proper pressure for fire.

SPECIFICATIONS AND PRICES

Nos.	Diam. of Fire Pan, Inches	Height to Top Height, Inches	Shipping Weight, lbs.,	List Price
080	18	33	45	.....
081	20	33	50	.....
082	22	33	55	.....
083	24	33	60	.....
084	28	33	70	.....

We always furnish the 24 inch fire pan unless otherwise specified.

FOR STATIONARY DOWN-DRAFT FORGES SEE INDEX



FIG. 5152

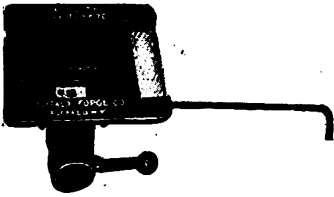
BLACKSMITHS' SUPPLIES**BUFFALO "VULCAN" TUYERE**

FIG. 1246

Blast is forced into fire-pot through three tapering, converging channels. The currents collide at high speed, and the blast is scattered all through the coal bed as from an explosion. The result is a large, deep intense fire, giving the cleanest, strongest welds, because of the high blast pressure. A quarter turn of rod brings the eccentric valve into position giving a small fire-

either side of the fire-pot, suitable for lighter work. Has exceptionally wide clearance for ashes and clinkers when valve is in this position. Another slight turn of valve practically loses the side-blast channels so that blast is delivered through center of valve only, for a small fire in the middle of firepot. The balanced and hinged ash gate opens and closes almost of self, making the dumping of ashes very convenient.

Weight 60 lbs. Price each.....



FIG. 1248

COAL AND CHARCOAL

FIG. 1249

Our blacksmiths' coal and charcoal is the very best that can be obtained. In sacks of about 200 lbs.

Price per 100 lbs.....



FIG. 1251

BLACKSMITHS' CONES OR MANDRELS**PLAIN PATTERN**

They are cast smooth and round, and are well adapted for forming rings, bands and similar work.

Number	1	1½	2	3	4	5
Height.....inches	32	40	48	52	54	50
Diameter at Base....."	8	10	12	14	16	24
" " Top....."	1	1	1	1	2	5
Weight.....pounds	55	90	115	140	200	451
Price.....per pound						

CAST IRON SWAGE BLOCKS

Number	1	2	3
Size.....inches	12½x12½x4	14½x14½x4	16x16x4½
Price, Regular per pound	.....	.....	.....
" Planed both sides "	.....	.....	.....

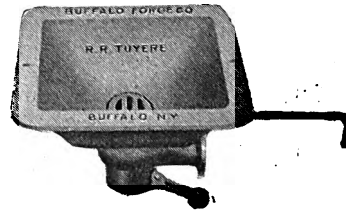
BUFFALO R. R. TUYERE

FIG. 1247

This is a very heavy tuiere iron made for the heaviest kind of work. Has revolving clinker breaking valve also hinged and balanced ash gate which opens and closes by a touch of the foot.

Overall width and length 12" x 14". Blast pipe diameter 3", inside depth of fire-pot 5".

Weight 75 lbs. Price each.....

DUCKS NEST TUYERE IRONS

No. 0	Weight each 11 lbs.	Price each.....	\$1.35
No. 1	Weight each 15 lbs.	Price each.....	2.00

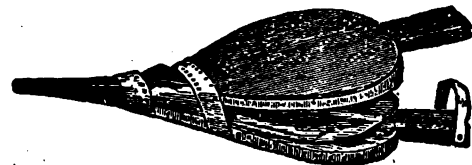
HAND AND MOULDERS' BELLWS

FIG. 1250

Hardwood boards, rough leather sides, faced with plain leather strips, studded with tacks. Japanned steel cap and funnel; leather valve flap. Hand bellows have one hole; moulders' bellows, two holes.

HAND

Size	Wt. per doz.	Price each
6 in.	11 lbs.	\$1.00
8 in.	18 lbs.	1.35
10 in.	30 lbs.	1.70
12 in.	40 lbs.	2.00

MOULDERS'

Size	Wt. per doz.	Price each
10 in.	30 lbs.	\$3.35
12 in.	40 lbs.	4.50
14 in.	50 lbs.	4.70

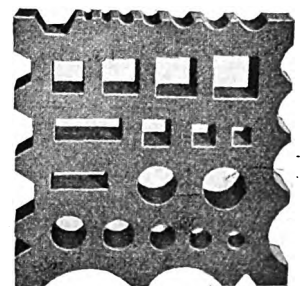


FIG. 1252

BLACKSMITHS' ANVIL TOOLS

PROPERLY DESIGNED—SUFFICIENT WEIGHT—CAREFULLY TEMPERED AND TESTED—POLISHED FINISH ENDS—BLACK FINISH BODY



FIG. 1258



FIG. 1259



FIG. 1260



FIG. 1261



FIG. 1262



FIG. 1263

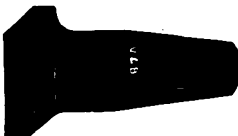


FIG. 1264



FIG. 1265

COLD EYE CHISELS

Width of Bit, inches.....	1	1 1/8	1 1/4	1 3/8	1 1/2	1 3/4	2
Length, inches.....	5 3/4	6 1/4	6 1/2	7	7 1/4	7 3/4	8
Weight each about, lbs.....	1 1/4	1 1/2	2	2 1/2	3	4 1/4	5 1/2
Price each.....	\$0.90	1.10	1.20	1.50	1.80	2.90	3.9

HOT EYE CHISELS

Width of Bit, inches.....	1	1 1/8	1 1/4	1 3/8	1 1/2	1 3/4	2
Length, inches.....	6 1/2	6 3/4	7 1/4	8 1/4	8 1/2	8 3/4	9
Weight each about, lbs.....	1 1/2	1 1/2	2	2 1/2	2 3/4	3 1/4	5
Price each.....	\$0.90	1.10	1.20	1.50	1.80	2.90	3.9

ROUND EYE PUNCHES

Average length 7 3/4 to 8 1/4 inches

Diam. of Pt., inches.....	1/4	3/8	1/2	5/8	3/4	7/8	1
Wt. each about, lbs.....	1 3/4	1 3/4	1 3/4	2 1/2	2 1/2	3	3 1/4
Price each.....	\$1.20	1.20	1.20	1.50	1.70	1.80	2.1

SQUARE EYE PUNCHES

Average length 7 3/4 to 8 1/4 inches

Diam. of Point, inches.....	1/4	3/8	1/2	5/8	3/4	7/8	1
Weight each about, lbs.....	1 3/4	1 3/4	2	2 1/2	2 1/2	3	4
Price each.....	\$1.50	1.50	1.50	1.70	2.00	2.00	2.4

SET HAMMERS

Size of Face, ins. square.....	1	1 1/8	1 1/4	1 3/8	1 1/2	1 3/4	2
Length over all, inches.....	5	5	5	5 1/2	5 1/2	5 1/2	6
Weight each about, lbs.....	1	1 1/3	1 3/4	2 1/4	2 7/8	3 3/4	5 1/2
Price each.....	\$1.20	1.40	1.50	1.70	2.00	2.40	3.1

HARDIES

Size of Shank, in.....	1/2	5/8	3/4	7/8	1	1 1/8	1 1/4
Width of Bit, in.....	1 5/8	1 3/4	2	2	2 1/8	2 3/8	2 1/2
Length over all, in.....	3 3/4	4 1/2	5	5 1/4	6 1/4	5 1/4	5 1/2
Approx. weight each, lbs.....	1 1/2	3/4	7/8	1 1/2	1 5/8	2 1/8	2 1/2
Price each.....	\$0.80	.90	.90	1.10	1.20	1.50	1.

FLATTERS

Size of face, inches.....	2	2 1/2	3	3 1/4	3 1/2	3 3/4	4
Length over all, inches.....	4 1/2	5	5 1/2	5 1/2	5 1/2	6	6
Approx. weight each, lbs.....	2 1/3	3 1/4	4 3/8	5 1/2	6 1/4	6 3/4	7 1/2
Price each.....	\$1.80	2.40	3.00	3.60	4.20	5.40	6.

HEADING TOOLS

Diam. of hole, inches.....	1/4	3/8	1/2
Length over all, inches.....	12 1/4	12 1/4	12 1/4
Weight each about, lbs.....	2 3/4	2 7/8	2 3/4
Price each.....	\$2.00	2.00	2.

Diam. of hole, inches.....	5/8	3/4	7/8	1
Length over all, inches.....	14	14	14 1/2	14
Weight each about, lbs.....	3 3/4	3 3/4	4 1/4	4 1/4
Price each.....	\$2.60	2.60	3.00	3.

BLACKSMITHS' ANVIL TOOLS

All anvil tools are properly designed, of sufficient weight and carefully tested. The faces are polished and the bodies are finished black and are rust-proof.

TOP FULLERS

Average length, 5½ to 7 inches

Size.....	¼	⅜	½	⅝	¾	⅞	1	1¼	1½
Approx. weight, each lbs....	2	2	2	2	2½	2½	2½	2½	2½
Price each.....	\$1.50	1.50	1.60	1.60	1.60	1.60	1.70	1.70	1.90
Size.....	1	1½	2	2½	3	3½	4	4½	5
Approx. weight, each lbs....	3½	3½	3½	3½	4½	5	5	5	8
Price each.....	\$2.00	2.00	2.10	2.40	2.60	2.90	3.50	4.00	

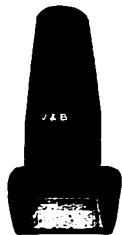


FIG. 1274

TOP FULLER

BOTTOM FULLERS

Shanks to fit one-inch hole in Anvil, average length, 4 to 5 inches.

Size.....	¼	⅜	½	⅝	¾	⅞	1	1¼	1½
Approx. weight, each lbs.	2	2	2	2	2½	2½	2½	2½	2½
Price each.....	\$1.50	1.50	1.60	1.60	1.60	1.60	1.70	1.70	1.90
Size.....	1	1½	2	2½	3	3½	4	4½	5
Approx. weight, each lbs.	2½	3½	3½	3½	3½	4½	5½	6½	
Price each.....	\$2.00	2.00	2.10	2.40	2.60	2.90	3.50	4.20	

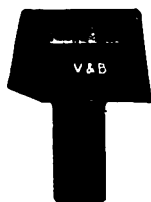


FIG. 1275

BOTTOM FULLER

TOP SWAGES

Average length, 5 to 6½ inches

Size.....	¼	⅜	½	⅝	¾	⅞	1	1¼	1½
Approx. weight, each lbs.	1½	1½	1½	1½	1½	1½	2¼	2¼	2¼
Price each.....	\$1.50	1.50	1.50	1.50	1.50	1.50	1.70	1.90	
Size.....	1½	2	2½	3	3½	4	4½	5	5½
Approx. weight, each lbs.	2½	2½	3	3	3½	4	4	4	4
Price each.....	\$1.90	2.00	2.20	2.30	2.60	2.60	2.60	2.80	
Size.....	1½	2	2½	3	3½	4	4½	5	5½
Approx. weight, each lbs.	4	4	4	5½	6½	7			
Price each.....	\$2.80	2.90	3.20	3.50	3.60	3.90			

BOTTOM SWAGES

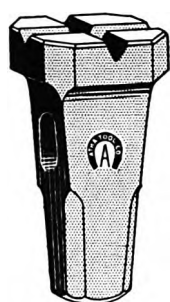
Shanks to fit one-inch hole in Anvil. Average length 4 to 5½ inches

Size.....	¼	⅜	½	⅝	¾	⅞	1	1¼	1½
Approx. weight, each lbs.	2	2	2	2	2½	2½	2½	2½	2½
Price each.....	\$1.50	1.50	1.50	1.50	1.50	1.50	1.70	1.90	
Size.....	1½	2	2½	3	3½	4	4½	5	5½
Approx. weight, each lbs.	2½	2½	3	3	3½	4	4	4	4
Price each.....	\$1.90	2.00	2.20	2.30	2.60	2.60	2.60	2.80	
Size.....	1½	2	2½	3	3½	4	4½	5	5½
Approx. weight, each lbs.	4½	4½	5	5½	5½	6½	6½	6½	6½
Price each.....	\$2.80	2.90	3.20	3.50	3.60	3.90			

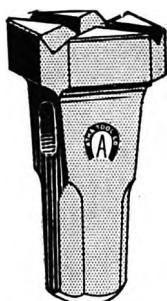


FIG. 1276

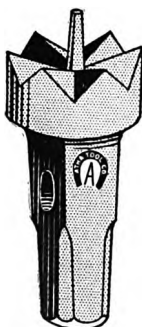
BOTTOM SWAGE



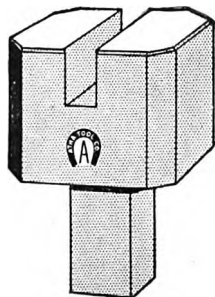
NO. 530—FIG. 1266



NO. 531—FIG. 1267



NO. 530-C—FIG. 1269



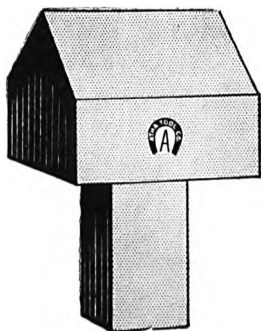
NO. 550—FIG. 1270



NO. 551—FIG. 1271



NO. 540—FIG. 1272



NO. 541—FIG. 1273

ROCK DRILL SHARPENING TOOLS

The size of the grooves or cuts in the Dollies and Sows listed below are those most generally called for. Dollies and Sows with special grooves can be furnished if desired, and prices will be quoted upon application.

DOLLIES

A tool used for dressing the bits of Rock Drills.

DOLLIES FOR PLUS BITS, SQUARE CUT

No. 530	Dimension of face	2 3/4 in. square
	Size of cut	3/4 " wide x 3/8 in. deep
	Length over all	6 "
	Weight	7 lbs.
	Price each	\$2.75

DOLLIES FOR PLUS BITS, DIAGONAL CUT

No. 531	Dimension of face	2 3/4 in. square
	Size of cut	3/4 " wide x 3/8 in. deep.
	Length over all	6 "
	Weight	7 lbs.
	Price each	\$2.75

DOLLIES FOR HEXAGON 6 POINT HOLLOW BITS

No. 530-C	Diameter of head	2 3/8 in.
	" " pin	1/8 "
	Length over all	6 "
	Weight	3 3/4 lbs.
	Price each	\$5.55

SOWS

A holding block for use in the anvil in connection with shaping rock drill

SOWS FOR PLUS BITS

No. 550	Dimension of face	3 1/4 in. square
	Size of cut	3/4 " wide x 1 1/4 in. deep
	" " shank	1 " square
	Weight	6 3/4 lbs.
	Price each	\$2.65

SET HAMMER

No. 551	Dimension of face	1 1/2 in. x 1 1/4 in.
	Length over all	6 1/2 "
	Weight	3 3/4 lbs.
	Price each	\$1.45

SPREADERS

TOP		
No. 540	Width of face	1 1/8 in.
	Length over all	6 3/4 "
	Weight	4 lbs.
	Price each	\$1.55
BOTTOM		
No. 541	Width of face	3 in.
	Size of shank	1 " square
	Weight	3 1/2 lbs.
	Price each	\$1.40

ANVILS

HILL'S SOLID STEEL

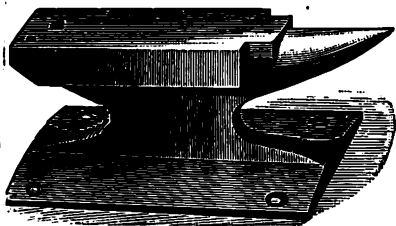


FIG. 1256

Forged from solid steel with a temper best adapted to an anvil. Face, sides and horn polished; the base japanned black. Length of horn two inches in addition to length stated below.

No. 2—Length 6 inches, width 2 inches, weight 5½ pounds. Price, each \$6.20

EAGLE

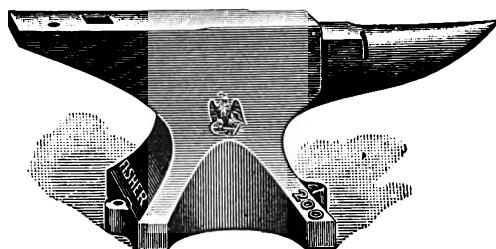


FIG. 1253

Anvil body is made of gun iron, which is warranted neither to settle nor break, and the face is one piece of crucible tool steel perfectly welded by a special process. It is ground to a true surface and tempered with uniform hardness to suit the majority of blacksmiths. The steel horn is tough and unhardened and will not break nor bend.

Approx. Weight Pounds	Nos.	Face				Horn	Price Each
		Length inches	Width Inches	Hardie Hole Sq. in.	Pritchel Hole inches	Length Inches	
20	2	6¼	2¼	½	⅝	4	.....
30	3	7¼	2¼	½	⅝	4	.....
40	4	8¾	3	⅝	⅝	5¼	.....
50	5	9¼	3	⅝	⅝	6½	.....
60	6	10	3	⅝	⅝	6½	.....
70	7	10½	3¼	⅝	½	6½	.....
Anvils weighing from 80 lbs to 300 lbs., sold per pound basis.							Price per lb.
80		10½	3¼	⅝	½	7½	.....
90		11	3¼	⅝	½	7½	.....
100		12	3½	¾	⅝	8½	.....
110		12¾	3½	¾	⅝	8½	.....
120		12¾	3½	¾	⅝	8½	.....
130		13½	4	¾	⅝	8½	.....
140		14	4	⅞	⅝	8½	.....
150		15	4	1	⅝	10	.....
160		15	4¼	1	⅝	10	.....
170		15	4¼	1	⅝	10	.....
180		15½	4¼	1	⅝	10	.....
200		16½	4¾	1⅞	⅝	11½	.....
225		16½	4¾	1⅞	⅝	11½	.....
250		17¼	5¼	1¼	⅝	11½	.....
275		17¾	5¼	1¼	⅝	11½	.....
300		19	5¼	1¼	⅝	11½	.....
400		21	6	1⅞	¾	13

Larger sizes on application.

HORSESHOERS' SPECIAL

150		14½	4	⅞	⅝	10
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ANVILS

HAY-BUDDEN SOLID WROUGHT IRON AND STEEL. BLACKSMITH PATTERN

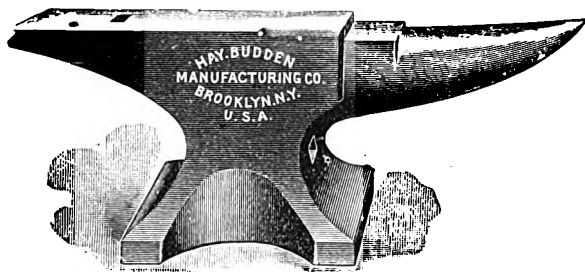


FIG. 4074

These anvils are made of a solid steel top welded to a wrought iron base, same being made from billets of special crucible analysis, and the top being of one piece, eliminating all possible chance of the face coming loose. The base is made up of the best forged iron and securely welded. The entire anvil is hand forged, which improves the material greatly, making it tough to meet with all requirements where anvils are used.

DIMENSIONS

Approx. Weight Pounds	Face		Horn Length Inches	Hardie Hole Square Inches	Pritchel Hole Inches	Price Per Pound
	Length Inches	Width Inches				
10	6	2	3½	1½	1½	.....
20	7	2¼	4	5/8	3/8	.....
30	8	2½	5	5/8	3/8	.....
40	9	2¾	6	¾	7/8	.....
50	9½	3	6½	¾	7/8	.....
60	10	3¼	7	¾	7/8	.....
70	11	3½	7½	¾	7/8	.....
80	12	3½	8½	¾	7/8	.....
100	13½	3½	9	¾	7/8	.....
125	15	3¾	10	7/8	7/8	.....
150	16½	4	10½	7/8	7/8	.....
175	17	4¼	11	1	7/8	.....
200	18	4½	11½	1 1/8	7/8	.....
250	20	4¾	12½	1 1/8	7/8	.....
300	21	5	13	1 1/4	7/8	.....
350	22	5½	13½	1 1/4	7/8	.....
400	23	6	14½	1 3/8	7/8	.....
450	24	6½	15½	1 3/8	7/8	.....
500	25	6¾	16	1½	7/8	.....
600	26	7	17	1½	7/8	.....
700	27	7½	18	1¾	7/8	.....
800	28	8	19	1¾	7/8	.....

TONGS

BLACKSMITHS' STRAIGHT LIP

Straight Lip Tongs, Set Open Upon Special Order.



FIG. 1293

Used for holding thin flat work. On account of the heavy stock in the jaws, they may be shaped by the blacksmith to suit his individual needs.

Number.....	14	16	18	20	22	24	26	28	30
Length, inches...	14	16	18	20	22	24	26	28	30
Weight, per pair, about pounds.	1½	1¾	2	2½	2¾	3	3½	4	4½
Price, each.....	\$1.20	1.30	1.40	1.40	1.50	1.60	1.70	1.80	1.90

BLACKSMITHS' PICK-UP

SINGLE PATTERN



FIG. 1296

Used for picking up hot work, either flat or round. Large Jaws for heavy work.

Number.....	22	24	26	28	30
Length, inches.....	22	24	26	28	30
Weight, per pair, about lbs.....	2½	2¾	3	3½	4
Price, each.....	\$2.50	2.75	3.00	3.50	4.00

TONGS

BLACKSMITHS' GAD



FIG. 1298

For general forging purposes.

Number.....	20
Length, inches.....	20
Weight, per pair, about lbs.....	2½
Price, each.....	\$1.70

BLACKSMITHS' PICK-UP

DOUBLE PATTERN



FIG. 1297

Used for picking up hot work, either flat or round.

Number.....	18	20	22	24
Length, inches.....	18	20	22	24
Weight per pair, about lbs.....	2½	2½	3	3¼
Price, each.....	\$2.00	2.10	2.20	2.50

HORSESHOERS'

RECESSED JAWS



FIG. 1299

Used by farriers for holding horseshoes. They are recessed on the inside of the face which gives them good holding power.

Number.....	0	2-0	3-0
Length, inches.....	12	14	16
Weight, per pair, about lbs.....	1½	1¾	2
Price, each.....	\$1.30	1.40	1.40

BLACKSMITHS' PICK

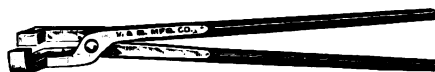


FIG. 1295

Principally used for holding picks while being sharpened.

Number.....	24
Length, inches.....	24
Weight, per pair, about lbs.....	4
Price, each.....	\$3.00

BLACKSMITHS' BOLT



FIG. 1294

LATHE TOOL



FIG. 1300

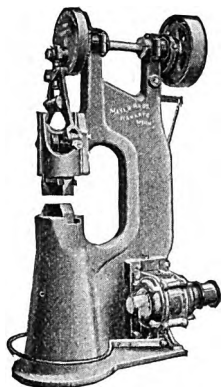
For holding bar stock when forging lathe tools.

Number.....	4	6	8	10	12	14	16	18	20
Length, inches.....	18	20	20	22	22	24	24	24	24
Weight, per pair, about lbs.....	1½	2	2½	2¾	2¾	3	3	3¾	3¾
Price, each.....	\$1.50	1.70	1.70	2.00	2.00	2.30	2.30	2.30	2.30

Number.....	16	18	20	22	24
Length, inches.....	16	18	20	22	24
To hold stock in.....	¾x¾	¾x¾	1x½	1x½	1½x¾
Weight, per pair about lbs. ...	2½	2¾	3	3	3¾
Price, each.....	\$3.80	4.00	4.20	4.60	5.00

LITTLE GIANT POWER HAMMERS

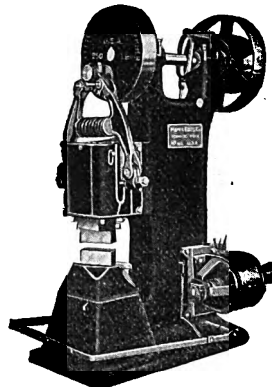
CAPACITIES 25, 50, 100, 250 AND 500 LB.



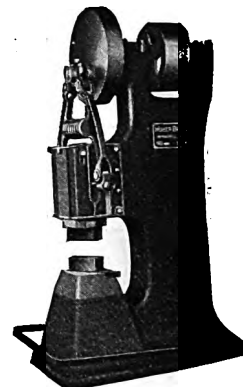
MOTOR DRIVE—FIG. 1283
25, 50 & 100 LB. MODELS



BELT DRIVE—FIG. 1284
25, 50 & 100 LB. MODELS



MOTOR DRIVE—FIG. 1285
250 & 500 LB. MODELS



BELT DRIVE—FIG. 1286
250 & 500 LB. MODELS

The main frame is one solid casting. The ram is a steel casting operating in a pressed steel channel, insuring accurate work and making breakage an impossibility. The hammer is driven by a friction pulley, allowing the operator to regulate or change the speed and weight of the blow. It is very durable and disposes of the countershaft, as it can be belted directly to line shaft. The connection between ram and crank pin is provided with a tension spring placed between two steel arms, which insures a perfectly cushioned blow at both upper and lower extremities of the stroke and at the same time increases the force of the blow. This tension is also provided with means to take up slack.

The connection is also equipped with an adjustable knuckle which connects to the brass pitman stem, and enables the operator to raise or lower the ram of the hammer in order to admit wide material. In the dies regularly furnished with these machines the best grade of hardened tool steel is used, and they are shaped in a manner to answer the purpose of general blacksmithing and plow work. Special dies of all descriptions can be had at reasonable cost. The Little Giant Triphammer is perfect in every detail. All its parts are provided with efficient means to taking up wear. The simplicity of its construction assures strength and durability and enables the purchaser to understand and operate it with a very small amount of practice.

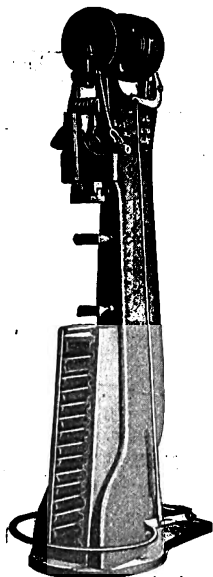


FIG. 1287
LITTLE GIANT POWER HAMMER

Range of material, 18 to 52 inches. Has adjustable anvil block.

The cut on the left shows the Little Giant Power Hammer for End-Ironing Singletrees and Neckyokes or other similar articles. The patented adjustable head and ram of the Little Giant Power Hammer is a marvel of simplicity yet so delicate are its adjustments that any blow is at the command of the operator's foot from a feather's weight, with the soft motion of a cat's paw, to the full rated weight and rapidity of blow and movement. Its all in the throat spring and adjustable knuckles—that's the explanation.

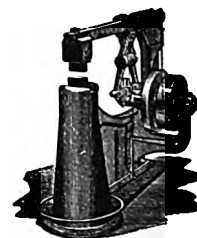
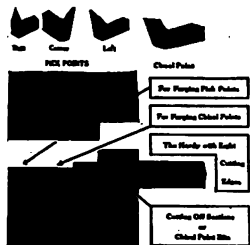


FIG. 1288
LITTLE GIANT "EASY" OR
HELVE HAMMER

Suitable for most any kind of work within its capacity.

LITTLE GIANT POWER HAMMERS

CAPACITIES 25, 50, 100, 250, AND 500 LB.



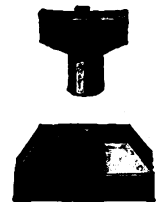
PICK POINT AND CHISEL BIT DIES
FIG. 1289

SPECIAL DIES

Are furnished with Little Giant Power Hammers for almost any special forging purpose.

Quotations furnished on receipt of drawing, or, better still, a finished specimen of the work to be done.

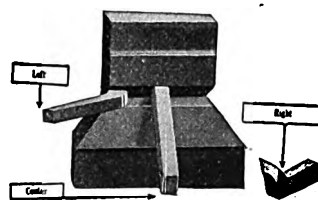
We illustrate here a few special dies in general use in certain industries. A set of special dies will turn out intricate forgings in a fraction of time required by hand and of positively even and far better quality.



SPRING CLAMP
DIES
FIG. 1291



PUNCHER PICK DIES
FIG. 1292



PICK POINT DIES
FIG. 1290

SPECIFICATIONS

	25 Lbs.	50 Lbs.	100 Lbs.	250 Lbs.	500 Lbs.	Easy	Neck Yoke Single Tree
Will forge stock up to...	1½ sq. or 2 rd.	2 sq. or 2½ rd.	2½ sq. or 3½ rd.	4 sq. or 5½ rd.	5½ sq. or 7 rd.	2 sq. or 2½ rd.	1½ sq. or 2 rd.
Upper die size of face....	1½"x3"	1¾"x3½"	3"x6"	3½"x8"	4½"x10"	1½"x3"	3½"x3½"
Lower die size of face....	2"x3"	2½"x3½"	3"x6"	3½"x8"	4½"x10"	2"x3"	adjustable
Lower die length of base	5"	5½"	6"	8"	10"	5"	adjustable
Variable length of stroke	6" to 7"	8" to 11"	9" to 12"	12" to 15"	14" to 19"	8" to 13"	6" to 7"
Throat room.....	6"	6"	7"	12"	15"	6"	18" to 52"
Weight of steel ram.....	25 lbs.	50 lbs.	100 lbs.	250 lbs.	500 lbs.	35 lbs.	25 lbs.
Weight of ham. comp....	800 lbs.	1500 lbs.	3000 lbs.	5000 lbs.	9500 lbs.	1000 lbs.	1000 lbs.
Height over all.....	5 ft. 4 in.	5 ft. 11 in.	6 ft. 6 in.	7 ft. 6 in.	9 ft.	3 ft. 4 in.	6 ft. 11 in.
Clear space required....	16"x27"	20"x30"	28"x42"	30"x54"	32"x62"	17"x43"	16"x27"
Belt Pulley size.....	3½"x10"	4"x12"	5"x14"	8"x18"	9"x24"	3"x12"	3½"x10"
Revolutions per minute.	400	350	300	200	150	350	400
Estimated H.P. required.	¾	1½	2½	4	7½	1½	¾
Price.....	.....	.....	.....	.....	.....	.....	.....
Special							
Pick pt. dies.....	.....	.....	.....	.....	.....	.....	not used
Chisel bit dies.....	not used	.....	.....	.....	.....	not used	not used
Puncher pick point and chisel bit dies.....	not used	.....	.....	.....	.....	not used	not used
Puncher Pick dies.....	not used	not used	.....	.....	.....	not used	not used
Motor Equipment							
Price, ex. com. with mot.	.....	.....	.....	.....	.....	not used	.....
Motor furnished.....	1 H.P.	2 H.P.	3 H.P.	5 H.P.	7½ H.P.	2 H.P.	1 H.P.
Weight, Extra							
Equipped with hammer...	180 lbs.	260 lbs.	310 lbs.	450 lbs.	700 lbs.	260 lbs.	180 lbs.
Equip used hammer...	230 lbs.	320 lbs.	520 lbs.	700 lbs.	1400 lbs.	320 lbs.	230 lbs.

For quantity production we do not recommend material more than half of above specifications.

FOR POWER HAMMERS OF LARGER CAPACITIES SEE PAGE NO. 815

PNEUMATIC RIVETING HAMMERS

Furnished in pistol grip and closed handle styles with outside and inside triggers.

Capacities, inch $\frac{1}{4}$, $\frac{5}{16}$, $\frac{3}{8}$, $\frac{1}{2}$, $\frac{5}{8}$, $\frac{3}{4}$, $\frac{7}{8}$, 1, and $1\frac{1}{4}$ diameter rivets.

Rivet sets for all size rivets from $\frac{1}{8}$ to $1\frac{1}{4}$ -inch diameter supplied in four styles—Button Head, Cone Head, Flush End and Auto Set.

RIVET SETS—UNIVERSAL

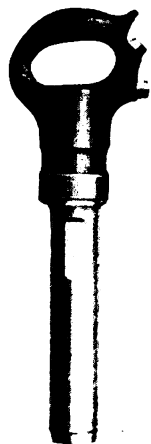


FIG. 1305

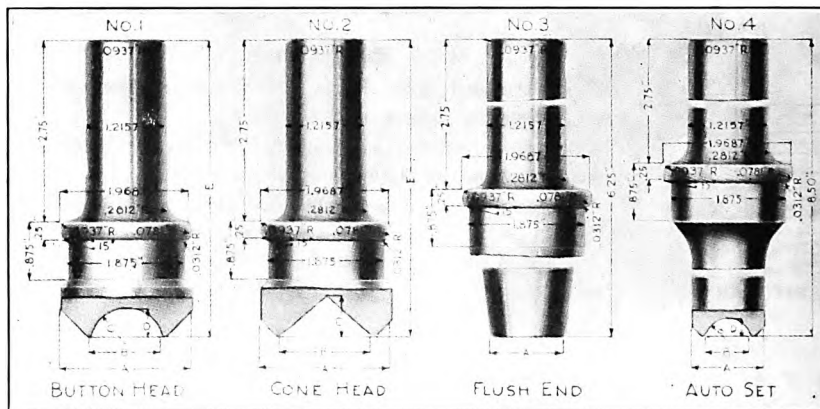


FIG. 1307

PNEUMATIC CHIPPING, CALKING, SCALING AND FLUE BEADING HAMMERS



FIG. 1308

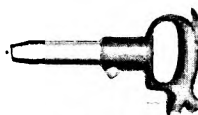


FIG. 1309



FIG. 1310



FIG. 1311

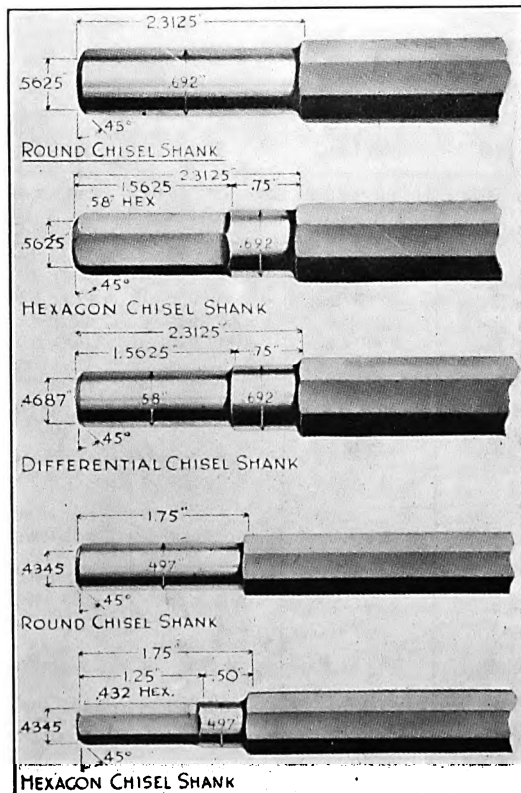


FIG. 1312

Furnished in the Pistol Grip and Closed Handle Styles. Made in five sizes: for very light, medium, general, heavy and extra heavy chipping and calking.

Chisel blanks for above tools furnished with round, hexagon or differential shanks.

Chisels for Chipping and Scaling Hammers can be furnished with the shanks in cut opposite.

PNEUMATIC SAND RAMMERS

For foundry work and tamping concrete, railroad ties, building blocks, water mains, etc. Made in Bench and Floor Type.

BENCH
RAMMER

FIG. 1306

FLOOR
RAMMER

FIG. 1314

FIG. 13

HAMMERS

UNHANDLED

SOLID FORGED STEEL—POLISHED FACES

HAND DRILLING OR SINGLE JACK

CALIFORNIA PATTERN

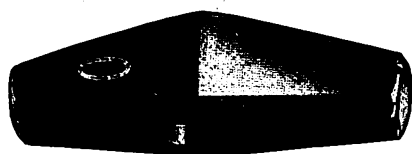


FIG. 1281

A well balanced hammer for one handed blows on Drills or Stone Cutters' Tools.

Double faced.

Weight each, lbs.	3	3½	4	4½
Length, inches	5	5¼	6	6¼
Price per pound	\$0.50	.50	.50	.50

NEVADA PATTERN

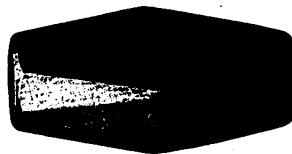


FIG. 1282

Double faced.

Weight each, lbs.	3	3½	4	4½
Length, inches	5½	5¾	6	6½
Price per pound	\$0.40	.40	.40	.40

NAPPING OR ROCK BREAKING



FIG. 1279

FOR BREAKING STONE ON PIKE ROAD

Double faced.

Weight each, lbs.	3	4	5	6	8	10	12	14
Length, inches	6	6¼	7½	7¼	7½	8	8½	8½
Price per pound	\$0.40	.40	.40	.30	.30	.30	.30	.30

STRIKING OR DOUBLE JACK

NEVADA OR LONG PATTERN

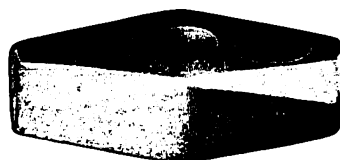


FIG. 1278

This is considered the most popular of the Striking Hammers.

Double faced.

Wgt. ea., lbs.	5	6	7	8	9	10	12	14	16	18	20
Length, in.	6½	6¾	7	7½	7¾	7¾	8	8¼	8½	9	9
Price per lb.	\$0.30	.30	.30	.30	.30	.30	.30	.30	.30	.30	.30

SLEDGES

BLACKSMITHS'

SOLID FORGED STEEL—HARDENED AND POLISHED FACE

CROSS PEIN



FIG. 1254

STRAIGHT PEIN

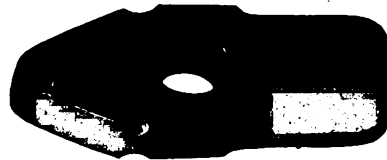


FIG. 1255

Weight each, lbs.	6	8	10	12	14	16
Length, inches	7	7	7¼	7½	8	8½
Price per pound	\$0.30	.30	.30	.30	.30	.30

Weight each, lbs.	6	8	10	12	14	16
Length, inches	7	7	7¼	7½	8	8½
Price per pound	\$0.30	.30	.30	.30	.30	.30

HAMMERS

BLACKSMITHS' HAND

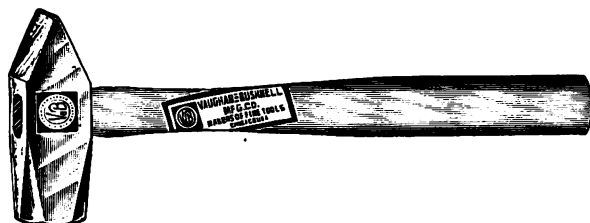


FIG. 1316

POLISHED—WHITE HICKORY HANDLES

Number.....	0	1	2	3	4	5
Weight, oz.....	26	32	42	48	56	72
Length, in.....	15	16	16	17	17	17½
Wt., lbs., per doz...	22½	31	39	46	50	59
Price, per doz.....	\$26.00	28.00	30.00	32.00	34.00	....

Weight ounces does not include handle.



FIG. 1317

MAYDOLES

SOLID CRUCIBLE CAST STEEL, POLISHED, SELECTED HICKORY HANDLES

Number.....	60	60½	61	62
Weight, each.....	4 lb.	3 lb. 8 oz.	3 lb.	2 lb. 10 oz.
Ap. wt. doz. lbs.....	56	50	42	36
Price, per doz.....	\$23.00	30.00	27.00	24.00

Weights each do not include handle.

MACHINISTS' RIVETING

POLISHED—WHITE HICKORY HANDLES

Number.....	0	1	2	3	4	5	6	7
Length, inches.	11	12	13	13	14	14	15	15
Weight, ounces	4	7	9	12	15	18	22	26
Wt. lbs., per doz	6½	7½	9½	12	16	18½	20½	23½
Price, per doz..	\$11.00	11.50	12.00	12.50	13.00	14.00	15.00	....

Weight ounces does not include handle.

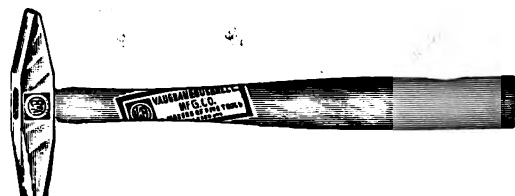


FIG. 1315

CHIPPING

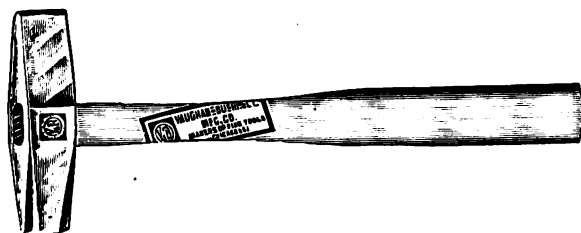


FIG. 1304

POLISHED—WHITE HICKORY HANDLES

Number.....	0	1	2	3	4
Weight, ounces.....	20	24	32	40	46
Length, inches.....	15	15	16	16	17
Weight lbs., per doz.....	20	22	31	34	39
Price per doz.....	\$26.00	27.00	29.00	31.00	33.00

Weight ounces does not include handle.

TINNERS' PANEING

POLISHED—WHITE HICKORY HANDLES

Number.....	1	2	3	4
Face.....	¾	7/8	1	1½
Weight, ounces.....	8	12	16	20
Length, inches.....	13	14	15	15
Weight lbs., per doz.....	10	13	18	22
Price, per doz.....	\$12.00	12.50	13.50	....

Weight ounces does not include handle.

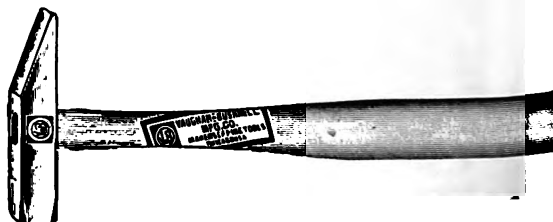


FIG. 1305½

HAMMERS**ADZE EYE NAIL**

**EXTRA REFINED STEEL—DROP FORGED—TEMPERED FACES AND CLAWS
POLISHED—WHITE HICKORY HANDLES**

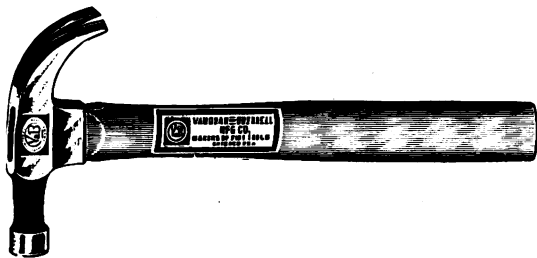


FIG. 1318

Non-Slip Claw. Will firmly grip any size nail from brad to spike. The eyes are forged smaller toward the center than at the ends which binds the handle so that the head cannot work loose. The sides are crowning and will not dent the wood when matching flooring or wainscoting.

Number	10	11	11½	12	12½	13	14
Length, inches...	14	14	13	13	12½	12	11
Weight, ounces..	24	20	16	13	10	7	5
Wt. lbs., per doz.	24	21½	18½	14½	12	9½	6
Price per dozen.....	\$18.00	17.00	16.00	15.50	15.00	14.50	

Weight ounces does not include handle.

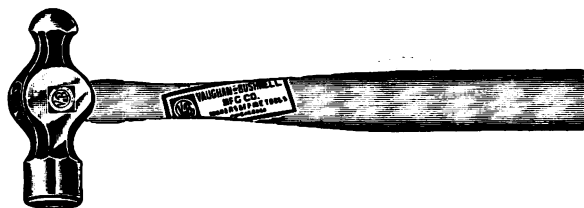
BALL PEIN, CROSS PEIN AND STRAIGHT PEIN

EXTRA REFINED STEEL—DROP FORGED—HARDENED FACES AND PEINS—WHITE HICKORY HANDLES

These Hammers are individually tempered and tested. They are the best that can be produced.

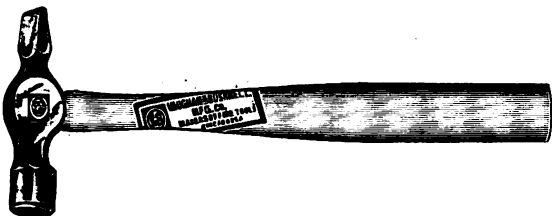
**BALL PEIN HAMMERS
POLISHED—WHITE HICKORY HANDLES**

Ball Pein Hammers are made in all sizes 7/0 to 8 except Nos. 5 and 7. In ordering specify size and mention "Ball Pein Pattern."

FIG. 1301
BALL PEIN

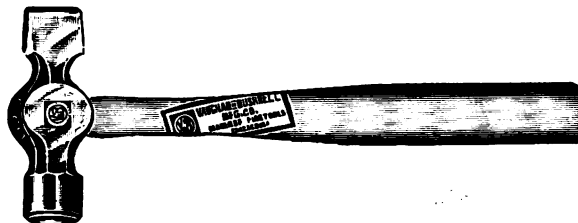
**CROSS PEIN HAMMERS
POLISHED—WHITE HICKORY HANDLES**

Cross Pein Hammers are made in all sizes 0 to 4. In ordering use the same numbers and list prices as for the Polished Ball Pein Hammers, adding the words "Cross Pein Pattern."

FIG. 1303
CROSS PEIN

**STRAIGHT PEIN HAMMERS
POLISHED—WHITE HICKORY HANDLES**

Straight Pein Hammers are made in all sizes 0 to 4. In ordering use the same numbers and list prices as for the Polished Ball Pein Hammers, but add the words "Straight Pein Pattern."

FIG. 1302
STRAIGHT PEIN**PRICE LIST BALL PEIN, CROSS PEIN AND STRAIGHT PEIN**

Number	7/0	6/0	5/0	4/0	3/0	2/0	0	1	2	3	4	5	6	7	8
Length over all, in...	10	10	11	12	13	14	14	15	16	17	17	17	17½	17½	17½
Weight, Hammer, without handle, ounces.	2	3	4	6	8	12	16	20	24	28	32	36	40	44	48
Weight, per doz. lbs.	3¾	4½	5½	7¼	10½	14	16	21	24	28	30	33	36	41	43½
Price per doz.	\$24.00	24.00	24.00	24.00	24.00	24.00	25.00	27.00	29.00	31.00	33.00	38.00	38.00	44.00	44.00

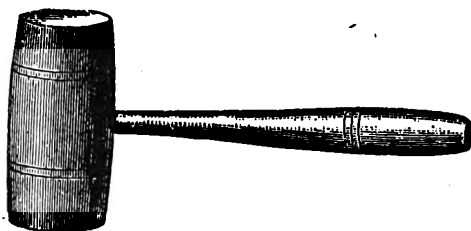
MALLETS**TINNERS**

FIG. 1319

Plain finish select hickory head and hickory handle mortised into head.

Size of head, inches.....	2¼x5	2½x5½
Length of handle, inches.....	10½	10½
Weight doz., lbs.....	10	10½
Price, each.....	\$0.30	.35

RUBBER

Solid Rubber Mallets for Fine Finished Work, Hardwood Handle, Running Through Head.

No.	Size	Weight, each	Each
2R	2¼x3½ in.	14½ oz.	\$2.50
3R	2¼x4 in.	18¼ oz.	3.50
4R	2¼x4¾ in.	26¾ oz.	4.00



FIG. 1320

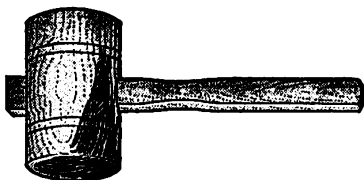
LIGNUM VITAE**ROUND HEAD AND SQUARE HEAD**

FIG. 1321

No.	Head		Length Handles inches	Wt. ea. about lbs.	Price each
	Length inches	Diameter inches			
5 Round	5	3	10½	1½	\$0.85
6 "	5½	3½	13	2½	1.25
7 "	6	4	13	3¾	1.65
11 Square	6	2½x3½	10½	1½	1.00
12 "	6½	2¾x3¾	13	2½	1.50
13 "	7	3x4	13	3	1.75

RAWHIDE

Every Engineer, Automobile Owner needs this mallet. Keeps machinery free from dents and is handy in putting on auto tires.

Mallet Number	Diameter inches	Price each	Extra Heads each
1	1¼	\$3.00	\$0.80
3	1¾	3.50	.90
4	2	5.50	1.50

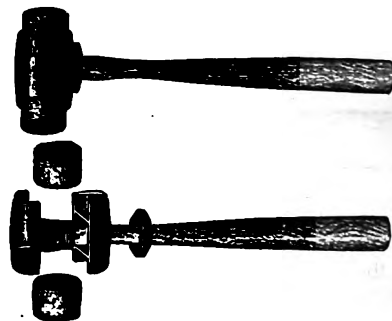


FIG. 1322

NAIL PULLERS**CYCLOPS**

FIG. 1323

The handle forming part of the pressure foot saves the hand from cut or injury by the blow of the ram. Gives control of both jaws. Guides the jaws directly and quickly to the nail. Holds the jaws steadily and firmly where placed.

The pivot cannot become loose by strain or wear. The steel parts are fire finished to prevent rust. The ram is finely japanned.

Length 18 inches, weight 4½ pounds, price each..... \$2.50

MORRILL

FIG. 1324

Shank and foot drop forged steel. I beam section, forged finish, ram cast iron japanned.

Has a handle and a hand guard to protect the hand, foot centrally mounted to keep jaws from spreading. No spring to break.

Length, 18 in. Thrust, 5 in. Weight, 4 lbs. Price each.. \$3.

HANDLES

ADZE EYE HAMMER



FIG. 1325
GENUINE HAND SHAVED

Length in.....	12	13	14	15
Wt. per dozen, lbs.....	5	5½	6	7
Price per dozen.....	\$2.50	2.50	2.50	2.50

TURNED

Length in.....	12	13	14	15
Wt. per doz., lbs.....	5	5½	6	7
Price per doz.....	\$2.00	2.00	2.00	2.00

MACHINIST'S HAMMER



FIG. 1328
GENUINE HAND SHAVED

Length in.....	14	16	18	20	22	24
Wt. per doz. lbs.....	6	7	8	9	10	11
Price, per doz.....	\$2.70	3.00	3.25	3.50	4.75	6.00

TURNED

Length in.....	14	16	18	20	22	24
Wt. per doz. lbs.....	6	7	8	9	10	11
Price, per doz.....	\$2.00	2.25	2.75	3.00	3.25	3.75

RIVETING HAMMER



FIG. 1327
GENUINE HAND SHAVED

Length in.....	12	14	16
Wt. per doz. lbs.....	3	4	5
Price per doz.....	\$2.50	2.50	2.75

TURNED

Length in.....	12	14	16
Wt. per doz. lbs.....	3	4	5
Price per doz.....	\$2.00	2.00	2.25

BLACKSMITH'S HAND HAMMER

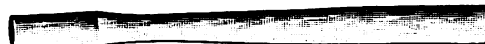


FIG. 1329
GENUINE HAND SHAVED

Length, inches.....	14	16	18	20
Weight per doz. lbs.....	5½	7½	8½	10
Price per doz.....	\$2.75	3.00	3.25	3.75

TURNED

Length, inches.....	14	16	18	20
Weight per doz. lbs.....	5½	8	9	10
Price per doz.....	\$2.10	2.50	2.70	3.00

BROAD HATCHET

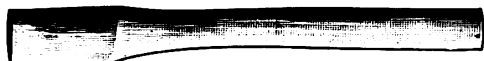


FIG. 1326
GENUINE HAND SHAVED

Length in.....	15	16	17	18
Wt. per doz., lbs.....	8	9	10	12
Price, per dozen.....	\$2.80	3.00	3.60	3.60

TURNED

Length in.....	15	16	17	18
Wt. per doz., lbs.....	8	9	10	12
Price, per doz.....	\$2.25	2.40	2.50	2.90

HAND DRILL OR SINGLE JACK HAMMER



FIG. 4075

No. 1 grade. Best quality second growth hickory. Polished.

Length, inches.....	16	18
Weight per doz. lbs.....	7	8
Price per dozen.....	\$3.00	3.25

No. 2 grade. Best quality turned hickory.

Length, inches.....	14	16	18
Weight per doz. lbs.....	6	7	8
Price per dozen.....	\$2.00	2.25	2.50

SLEDGE



FIG. 1330
BEST QUALITY

Length, inches.....	28	30	32	34	36	40
Weight per doz. lbs.....	14	15	18	20	22	24
Price per dozen.....	\$6.90	8.00	8.00	9.00	9.00	10.25

HANDLES**SURFACE PICK**

FIG. 1331

TURNED, OVAL—HICKORY

A Quality, length 36 in., weight per doz. 30 lbs.	Price per doz.	\$14.00
B Quality, length 36 in., weight per doz. 28 lbs.	Price per doz.	13.50
C Quality, length 36 in., weight per doz. 24 lbs.	Price per doz.	7.00

DRIFTING PICK

FIG. 1332

REGULAR PATTERN, OVAL

A Quality, length 34 inches, eye 3x1 inch, weight per doz. 26 lbs.	Price per doz.	\$11.50
B Quality, length 34 inches, eye 3x1 inch, weight per doz. 25 lbs.	Price per doz.	10.50
C Quality, length 34 inches, eye 3x1 inch, weight per doz. 25 lbs.	Price per doz.	6.50

POLL PICK

A Quality, length 34 inches, eye 3x1 inch, weight per doz. 24 lbs.	Price per doz.	\$10.50
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D SHOVEL

FIG. 1333

D Bent Shovel Handle, length 30 inches. Approx. weight per doz. 20 lbs.	Price per doz.	\$7.40
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D SCOOP

FIG. 1334

D Bent Scoop Handle, length 30 inches. Approx. weight per doz. 20 lbs.	Price per doz.	\$7.40
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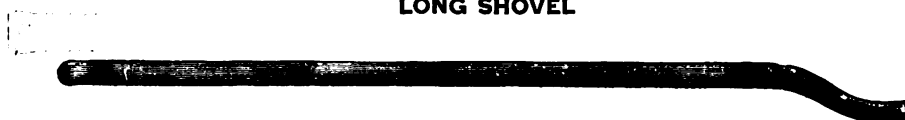
LONG SHOVEL

FIG. 1335

Long Shovel Handle, length 4½ feet. Approx. weight per doz. 23 lbs.	Price per doz.	\$8.00
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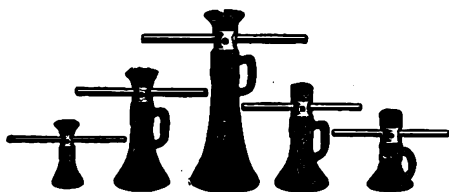
JACK SCREWS**BELL BOTTOM**

FIG. 1348

Wrought iron screw; cast iron stand. Furnished without levers. Levers extra. Specify if wanted.

Capacity Tons	Screw inches Diam. Length	Height Over all Inches	Weight Lbs.	List Price	Capacity Tons	Screw inches Diam. Length	Height Over all, Inches	Weight Lbs.	List Price
10	1 1/4 x 8	11	12	\$3.40	12	1 1/2 x 16	20	24	\$6.75
10	1 1/4 x 10	13	15	3.80	16	1 3/4 x 8	12	20	5.00
10	1 1/4 x 12	15	16	4.20	16	1 3/4 x 10	14	21	5.75
10	1 1/4 x 14	17	16	4.60	16	1 3/4 x 12	16	26	6.25
12	1 1/2 x 8	12	15	4.25	16	1 3/4 x 14	18	30	6.75
12	1 1/2 x 10	14	16	4.75	16	1 3/4 x 16	20	32	7.50
12	1 1/2 x 12	16	22	5.25	16	1 3/4 x 18	22	34	8.50
12	1 1/2 x 14	18	23	6.00	20	2 x 8	12 1/2	23	6.00

JOYCE BELL-BASE SCREW JACKS

Joyce Bell-Base Jacks are much better than Jack Screws for bracing, house moving and heavy lifting. With the six-way head the lever can be applied from six positions. You don't have to swing it through a quarter revolution each time, nor is the screw weakened, as two holes are drilled through the stem at right angles to each other. The six-way head is very handy in cramped places, and the strong screw makes heavier work safe with a small jack. If you have ever used jacks you can appreciate the convenience of this.

That closed flat base is another good feature. The jack will not cut rings into the blocks on which it is placed. Besides the screw is protected and kept clean, where in other makes with open base, dirt and sand collect on its oily surface and grind the threads to ruin. Even the caps of Joyce Jacks are protected by accurate fitting, and cover the top of the screw entirely.

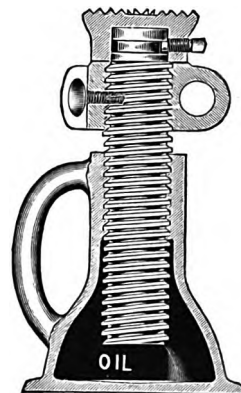


FIG. 1345

DIMENSIONS AND PRICES

Jack No.	Height when Down, Inches	Rise Inches	Diam. of Screw, Inches	Weight Pounds	Capacity, Tons	SIX-WAY HEAD	RATCHET HEAD
						Price	Price
98	8 1/2	3 1/2	1 7/8	15	6	\$ 7.00	\$ 9.00
99	10 1/2	5 1/2	1 7/8	18	6	7.50	9.50
100	12	7	1 7/8	20	6	8.50	11.00
101	10	4	2	22	12	9.00	11.50
102	12	6	2	26	12	10.00	12.50
103	14	8	2	29	12	11.00	13.50
107	22	16	2	45	12	14.00	16.50
111	10	4	2 1/4	25	15	10.00	12.50
112	12	6	2 1/4	28	15	11.00	13.50
113	14	8	2 1/4	34	15	12.00	14.50
120	10	3	2 1/2	35	25	14.00	16.75
121	12	5	2 1/2	36	25	15.50	18.25
122	14	7	2 1/2	41	25	17.00	19.75
123	16	9	2 1/2	45	25	18.50	21.25
125	20	13	2 1/2	60	25	21.00	23.75
127	24	17	2 1/2	75	25	24.00	26.75
128	26	19	2 1/2	69	25	25.50	28.25
130	30	23	2 1/2	85	25	28.50	31.25
132	12	4	3	55	35	21.00	24.00
133	14	6	3	65	35	23.00	27.00
134	16	8	3	75	35	25.00	28.00
136	20	12	3	90	35	29.00	32.00
138	24	16	3	115	35	32.00	35.00
140	28	20	3	125	35	36.00	39.00
141	30	22	3	135	35	38.00	41.00



FIG. 1345½

JOYCE JOURNAL JACKS

FULL ROLLER BEARING

These Jacks are of the full roller bearing type provided with a positive stop so arranged to absolutely prevent the operator from driving the ram out beyond the safety limit of the screw, avoiding accidents from this cause.

These Jacks are the safest and most powerful short lift Jacks on the market.

DIMENSIONS AND PRICES

15 TONS CAPACITY					25 TONS CAPACITY				
Jack No.	Height when Down, Inches	Rise of Load, Inches	Weight, Pounds	Price Each	Jack No.	Height, Inches	Rise, Inches	Weight, Pounds	Price Each
148	8	3	35	\$35.00	152-A	10	5	35	\$38.50
149	9¾	4¾	40	35.00	153-A	11	5¼	68	55.00
150	11	6	45	35.00	153-B	10	5	65	55.00
					153-C	9	3¾	61	55.00

JOYCE GEARED SCREW JACKS

FULL ROLLER BEARING

The Full Roller Bearing Geared Screw Jack has been designed to give the highest efficiency possible in a Screw Jack and the greatest speed consistent with safety. Design is such that the entire working parts can be removed through the top of the Jack without taking the sleeve off the standard.

The Positive Stop is a distinctive feature of this Jack. The Stop is so arranged to absolutely prevent the operator from driving the sleeve out beyond the safety limit of the screw and accidents from this cause are impossible. Perfect lubrication. By special design there is provided a system which assures constant lubrication to all moving parts.

LOCOMOTIVE TYPE

BRIDGE TYPE



FIG. 1346



FIG. 1347

LOCOMOTIVE TYPE 25 TO 75 TONS CAPACITY

BRIDGE TYPE

25 TO 70 TONS CAPACITY

The Locomotive Type is used principally for Railroad work, in machine, car and locomotive shops, round-house and general use, and is made in fifteen different heights and sizes.

The Bridge Type has a Ground Lift for low set loads. The whole load may be easily raised on the top of the Jack—or one half the rated capacity on the Ground Lift at Bottom.

This Jack can be furnished in either round or square base, and is best suited for bridge work, wreck car service, repair shops, locomotive shops and for moving engines, boilers, machinery and handling structural material.

DIMENSIONS AND PRICES

LOCOMOTIVE TYPE							BRIDGE TYPE						
Jack No.	Height when Down, Inches	Rise of Screw, Inches	Diam. of Screw, Inches	Weight of Jack, Pounds	Capacity, Tons	Price	Jack No.	Height when Down, Inches	Rise of Screw, Inches	Diam. of Screw, Inches	Weight of Jack, Pounds	Capacity, Tons	Price
154 RB	22	12	2	114	25	\$116.00	154 GL	22	12	2	119	25*	\$121.00
155 RB	26	16	2	128	25	124.00	155 GL	26	16	2	133	25*	129.00
156 RB	34	24	2	157	25	138.00	158 GL	22	12	2½	180	35*	153.00
158 RB	22	12	2½	172	35	148.00	160 GL	27	17	2½	208	35*	163.00
160 RB	27	17	2½	200	35	158.00	163 GL	20	9½	2¾	205	50*	178.00
161 RB	30	20	2½	217	35	163.00	164 GL	24	13½	2¾	230	50*	183.00
163 RB	20	9½	2¾	200	50	173.00	165 GL	26	15½	2¾	253	50*	188.00
164 RB	24	13½	2¾	220	50	178.00	170 GL	27	16	3	300	75*	250.00
165 RB	26	15½	2¾	243	50	183.00							
166 RB	31	20½	2¾	267	50	188.00							
168 RB	38	27½	2¾	314	50	213.00							
170 RB	27	16	3	288	75	245.00							

*Capacity on ground lift is one-half the capacity here given, which is for head lift.

JOYCE HYDRAULIC JACKS**WITH GROUND LIFT—INSIDE PUMP**

The ground lift type of jack is used principally in railway wreck cars, machine shops and for moving engine boilers and machinery, where there is not room to get the head of the jack underneath the load.

The ground lift claw and sleeve are cast as one piece from crucible steel and rigidly secured to the head of the jack.

This type of jack is made in 25 different sizes—4 to 60 tons capacity—and will work in either vertical, horizontal or inclined position.

**WITH BROAD BASE
INSIDE PUMP**

The broad base of this type of jack gives a solid foundation where the jack stands on ground or light boards, and there is sufficient room for the jack underneath load.

This type of jack is used principally for railroad work in machine, car and locomotive shops.

These jacks are made in 30 different sizes—4 tons to 60 tons capacity—and will work in either vertical, horizontal or inclined position.

FIG. 1349

FIG. 1350

GROUND LIFT—GL SERIES

Jack No. GL	412	712	718	1006	1012	1018	1509	1512	1518	2009
Capacity, tons	4	7	7	10	10	10	15	15	15	20
Rise, inches	12	12	18	6	12	18	9	12	18	9
Height down, inches	23	24	30	19	25	31	23	26	33	23
Weight, pounds	60	78	95	100	115	153	120	135	165	137
Price, each	\$105.00	112.00	122.00	119.00	125.00	135.00	128.00	134.00	158.00	154.00

Jack No. GL	2012	2018	3009	3012	3018	4012	4018	5012	6012
Capacity, tons	20	20	30	30	30	40	40	50	60
Rise, inches	12	18	9	12	18	12	18	12	12
Height down, inches	26	33	24	27	33	27	33	27	27
Weight, pounds	155	191	213	236	281	236	288	290	295
Price, each	\$165.00	181.00	214.00	225.00	239.00	283.00	355.00	313.00	345.00

BROAD BASE—BB SERIES

Jack No. BB	409	412	709	712	1006	1009	1012	1018	1509	1512	1518	2009	2012
Capacity, tons	4	4	7	7	10	10	10	10	15	15	15	20	20
Rise, inches	9	12	9	12	6	9	12	18	9	12	18	9	12
Height down, in.	20	23	21	24	18	22	25	31	22	25	32	22	25
Weight, pounds	54	60	69	75	81	89	97	112	115	125	137	120	129
Price, each	\$91.00	93.00	96.00	100.00	107.00	110.00	113.00	118.00	113.00	118.00	135.00	144.00	153.00

Jack No. BB	2018	3009	3012	3018	4009	4012	4018	5009	5012	5018	6009	6012	6018
Capacity, tons	20	30	30	30	40	40	40	50	50	50	60	60	60
Rise, inches	18	9	12	18	9	12	18	9	12	18	9	12	18
Height down, in.	33	24	26	33	24	27	33	24	27	33	24	27	33
Weight, pounds	161	189	205	230	191	214	249	210	225	250	228	240	264
Price, each	\$161.00	183.00	193.00	205.00	222.00	250.00	321.00	253.00	278.00	340.00	287.00	318.00	364.00

**JOYCE
PULLING AND PUSHING JACKS**

These Jacks are principally used in steel car repair work where heavy pulling or pushing is required.

The No. 52-A Pulling Jack is arranged with loose hook.

No. 56 is arranged with swivel head to accommodate any angle.

PULLING—FIG. 1349½

PUSHING—FIG. 1350½

DIMENSIONS AND PRICES

PULLING JACK					PUSHING JACK	
Numbers	52	52-A	53	55	Number	56
Length inside Hooks when closed, in.	24	24	36	39½	Height when down, inches	29
Run of Screws, inches	12	12	18	19	Rise of Screw, inches	17
Dia. Screw, inches	1½	1½	2¼	1¾	Dia. Screw, inches	2½
Capacity, tons	8	8	15	10	Capacity, tons	20
Weight, pounds	25	40	65	68	Weight, pounds	70
Price, each	\$22.00	28.00	40.00	38.00	Price, each	\$33.00

JOYCE EMERGENCY JACK

NO. 89

A COMBINATION JACK AND CRANE

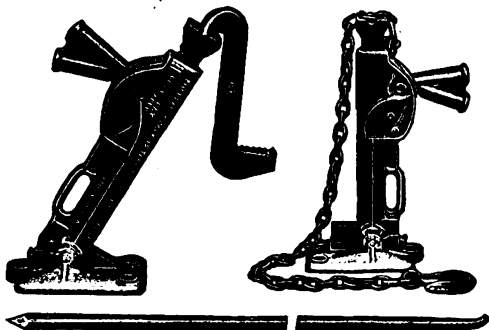


FIG. 4076

Single acting, operating on downward stroke of lever.

It lifts, lowers, pushes, or pulls at any angle. Is a combination of a crane and a jack with a detachable ground lift which may be used in emergency cases where chain cannot be used. It pivots on its base—from a vertical position to within twenty degrees of the horizontal. Full automatic either raising or lowering notch by notch with equal facility. The change from a raising to a lowering action is accomplished by shifting small lever on outside of frame to a position marked up or down. The Fulcrum and Trunnion are of one piece of steel and rotate in a hardened steel closed end lubricant—retaining bushing.

Standard equipment. Five feet of chain with grab hook, five foot steel lever—pinch bar construction, detachable ground lift. Weight complete, 127 lbs. Capacity, 15 tons, height, 24 inches, rise, 12½ inches.

Price complete

JOYCE PLAIN LEVER JACKS

2 TO 15 TONS

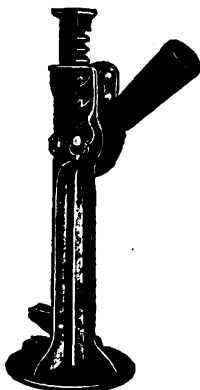
Used principally in mines and by truckers, riggers and contractors.

This is the simplest form of jack for raising and lowering a load, consisting of a frame, a bar, a lever and a retaining pawl. The frame, lever socket and retaining pawl are malleable iron, the bar forged steel and the pinion crucible steel.

The teeth on bar and pinion are milled; the pins are of machinery steel, and all wearing surfaces are hardened steel.

DIMENSIONS AND PRICES

Number.....	1A	2A	2B	4	4A	6	10	10A
Capacity, tons.....	2	2	2	4	4	15	10	10
Height when down, in.....	16	18½	18½	22½	18½	26½	27	22½
Rise of Bar, inches.....	8¼	10	10	14	10½	14	16	11½
Size of Jack, in. square.....	1¼	1¼	1¼	1½	1½	2	1¾	1¾
Weight, pounds.....	24	28	25	40	37	92	76	63
Price, each.....	\$12.00	12.00	12.00	17.00	17.00	30.00	24.00	24.00



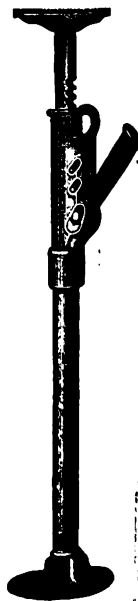
NO. 4—FIG. 1343

JOYCE MINING JACK

NO. 32A

This is a special lever jack designed for raising roof timbers in tunnels and mines. Two jacks are used at once, one being placed on either side of the tunnel. The timber is placed on the jacks and they are then run up until the timber is in position, when uprights can be inserted and the jacks removed, ready for the next timber.

Height when down, 44 inches; Rise of Bar, 30 inches; Size of Bar, square, 1½ inches; Capacity, 4 tons; Weight 70 lbs. List Price.....\$25.00
Extra run, per inch.....1.00



NO. 32A—FIG. 1344

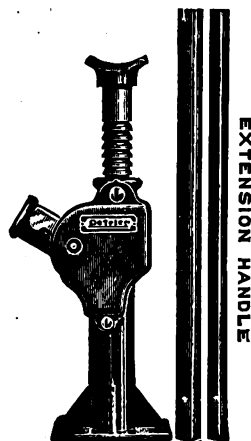
AUTOMOBILE AND TRUCK JACKS



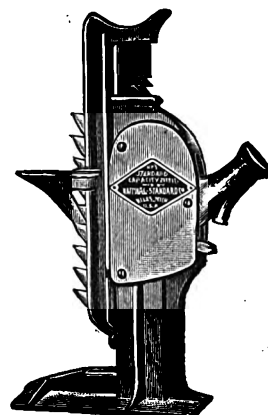
NO. 2—FIG. 1339



NOS. 100 & 200—FIG. 1337



PETELER—FIG. 4077



STANDARD—FIG. 4078

BARRETT AUTOMATIC LOWERING

NO. 2—10 TON CAPACITY—DOUBLE ACTING

This Jack is extensively used by Contractors, Truck men, Industrial Concerns, Street Railway Companies, and others requiring a Jack suitable for all lifting purposes. As a general service jack it has no equal in strength, safety, easy operation, light weight and moderate cost. Being double-acting the load is moved up or down half a notch at each stroke on both upward and downward movements of lever. The direction is controlled by an eccentric at side of frame. The load is lowered gradually and cannot be suddenly dropped as with a trip jack. Will operate at any angle.

Malleable Iron Frame and Base, Forged Steel Rack, Machine Cut Teeth. Hardened Steel Bearings. Selected Ash or Hickory Handle.

BARRETT GEARED MOTOR TRUCK

NOS. 100 AND 200—3 AND 5 TONS CAPACITY

The leverage is so compounded by gears that the load is lifted with only one-third the effort required with direct leverage. These Jacks are recommended for constant service in garages where less sturdily built jacks soon wear out.

Their universal use on Motor Trucks is due to their high quality and "safety-first" features.

PETELER AUTO

1½ TON CAPACITY

Will lift 3,000 pounds with a wide margin of overload. It works to the limit of the lifting bar with no "danger line". It cannot break.

It operates faster and easier than any other similar device—with short, easy strokes, lifting $\frac{3}{8}$ of an inch each stroke. The stroke is so short that the overhang of the car cannot interfere with the up and down movement of the handle.

To lower the load you don't have to touch the jack. A tap of the handle operates a small lever which reverses the action. And when all the load is off the jack the lifting bar automatically drops, upon a slight movement of the handle.

The long extension handle enables the operator to raise and lower the car while standing. No stooping or crawling necessary.

STANDARD AUTO

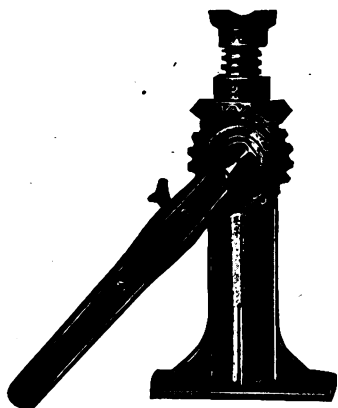
NO. 3—1 TON CAPACITY

Standard Auto Jack No. 3 is a heavy, easy-operating jack with an additional step which is adjustable. It has an extra heavy cut steel rack-bar and is exceptionally well made and well reinforced throughout, furnishing great strength and durability. The Standard No. 3 was designed for the larger-sized cars. The base is unusually large and well braced. The entire construction of the Standard No. 3 jack combines the use of the highest grade materials and careful workmanship. The adjustable lifting step offers an additional advantage and makes this model an ideal seller to high-class patronage.

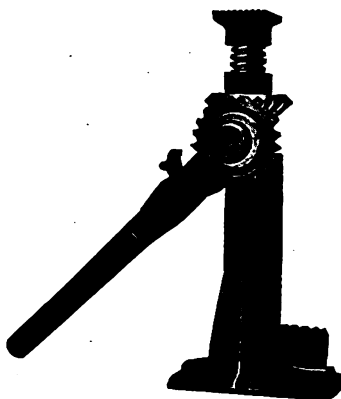
DIMENSIONS AND PRICES

No.	Capacity in Tons	Height Inches	Raise Inches	Size of Bar, in.	Weight with Lever, lbs.	List Price
Standard 3	1	11½	6¼	¾x1	11½	\$6.00
Peteler 1	1½	8½	6	1¼ Round	8	7.50
Peteler 2	1½	10½	7½	1¼ Round	9	7.50
Barrett 100	3	10¾	5¼	¾x1	16	12.50
Barrett 200	5	13	6¾	1¼x1¼	28	13.25
Barrett 2	10	21	10	1½x1½	73	30.00

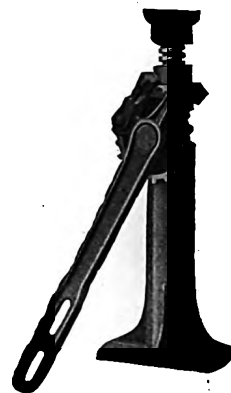
RELIABLE TRUCK JACKS



NO. 26—FIG. 1340



NO. 27—FIG. 1341



NO. 38—FIG. 1342

NO. 26—CAPACITY 6 TONS

Designed especially for the heavier Auto Trucks, Traction Engines and Threshers. Constructed of the best material throughout, with 1½-inch steel machine-cut screw, without foot extension; broad, substantial base, no loose handle to get lost, quick in its operation, strong and compact, light weight, yet has an extremely large capacity.

NO. 27—CAPACITY TOP, 8 TONS—FOOT, 3 TONS

This Jack also designed for Traction Engines, Threshers, Street Cars, Auto Trucks and for all heavy work where a Jack of light weight and large capacity is required. For quick adjustment the screw can be raised with one hand and the top gear spun to the desired position with the other. The Jack has 1½-inch steel, machine-cut screw with foot extension. The stand and the other working parts are of the best malleable.

NOS. 37, 38 & 39.—CAPACITY 5 TONS

These Jacks are designed and built to be used with the smaller type of trucks. They are very simple in construction, of large capacity, easy of operation and, in fact, are the most practical and popular Truck Jacks on the market today. They are self-contained with no loose parts to get lost, self-locking at any point, quickly adjusted to the different heights of work. Have 1¼-inch steel screw without foot extension.

DIMENSIONS AND PRICES

Number.....	26	27	37	38	39
Capacity, tons.....	6	Top 8, Foot 3	5	5	5
Adjustment, inches.....	10 to 16	13 to 19	13½ to 21	10½ to 16	12½ to 19½
Weight, pounds.....	14	17	14	12	14
Price, each.....	\$10.00	8.70	8.00	6.00	8.00

GEMCO "ONE STROKE" SERVICE JACK

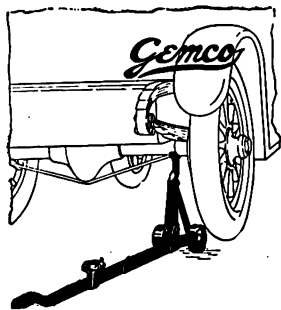


FIG. 4079

With one stroke the GEMCO "One Stroke" Service Jack is correctly adjusted to lift any car, whether heavy or light, low or high, and at the front or rear. The long handle gives enough leverage to quickly and easily raise any car. Two seconds is all that is required.

At any adjustment, the Jack locks automatically. Under no circumstances, can the weight of the car cause slipping as the hardened steel cam acts as a lock.

With an ordinary jack it is necessary to crawl under the car to make several adjustments only to find that the jack is too low or too high, necessitating some more adjustments.

On account of the width of 8 inches, it can easily be put out of the way. The range of lifting is from 8 to 18¼ inches.

The design and construction is strong, compact and practically indestructible—nothing to get out of order. Steel is used for everything but the supporting arm and the wheels, which parts are made of high grade castings.

This is an excellent jack for quick and hard service in garages and tire service stations. Weight, 32 pounds, length, 5 feet 8 inches.

Price, each.....\$12.00

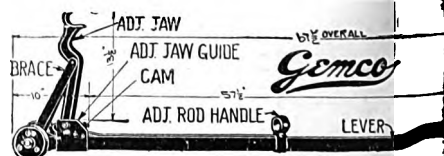


FIG. 4080

RED DEVIL DOLLY JACK

One Red Devil will do everything you formerly required of a number of special jacks. For moving cars in factory or salesroom; loading for shipment; unloading; placing cars in storage; in display windows; for extricating cars in a crowded garage, in congested places on the pavement; for raising cars for adjustment; changing tires; truing up wheels, putting on chains; testing brakes; on the wash rack or wherever a jack or turntable is required the Red Devil Dolly Jack will do the work.

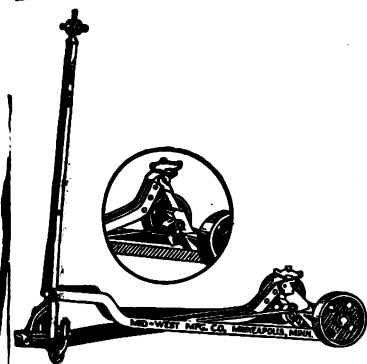


FIG. 1359

Range of Adjustment, inches.....	8 to 14½	Diameter of wheels, inches.....	8¼
Stroke of handle, inches.....	4	Distance between wheels, inches.....	13
Face of wheels.....	2	Length.....	4 ft. 6 in.
Tread, inches.....	15		
Steel Construction: Steel roller bearings in large wheels.		List price.....	\$57.00
Shipping weight, lbs.....	125		

THE EXCEL AUTO JACK

For heavy duty in Garages, Service Stations, Tire Agencies, Race Track Pits and large Private Garages. Can be adjusted immediately to any part of frame or chassis. Wide heavy base, fitted with rollers for easy handling. One upward motion lifts the swivelhead, or entire housing, into proper position.

One downward sweep of the 60-inch handle lifts the car instantly. Releasing the rapping latch permits lowering the load. Upward kick on ball pawl drops housing, and the jack can be withdrawn at once.

LIFTING RANGE

Main Jack: Lowest lift 10½ inches; highest lift 24½ inches on any car, without locking.

Toe Extension: Lowest lift 4½ inches; highest lift 15 inches.

Capacity of Jack, 2000 to 3000 lbs. Leverage of Handle, 60 inches. Weight of Jack, 8 lbs.

Price.....\$34.00

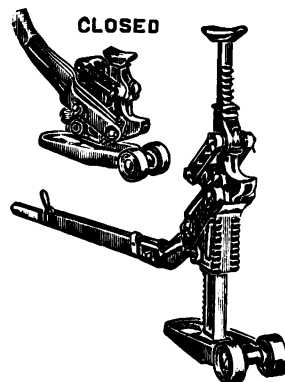


FIG. 1361

WEAVER NEW-WAY JACK

For quick action in lifting, or moving cars or trucks in the garage, show room, service station, tire shop, etc. The length of the frame and wheels over all is only forty inches and this enables it to be easily and conveniently manipulated in cramped quarters. The wheels pivot and are guided and controlled by the handle. Has an enormous leverage which makes it possible for one man to lift five thousand pounds with perfect ease. It is equipped with a very secure and safe ratchet lift, with ample range so that any car can be lifted sufficiently high in one or two strokes of the handle. The handle is so designed that the weight of the load will not throw the handle violently against the car. A light tension balance spring draws the handle into a perpendicular position. Extremely heavy and well constructed. The lifting mechanism is of high-grade hardened steel. The wheels are mounted on roller bearings and the caster under the front is equipped with a full set of ball bearings. Capacity, 5000 pounds. Weight, 100 pounds.

Price.....\$50.00

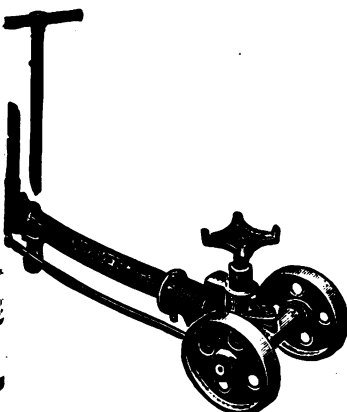


FIG. 4081

WEAVER AUTO TWIN-JACKS

MADE IN TWO SIZES—GARAGE SIZE. SMALL CAR SIZE

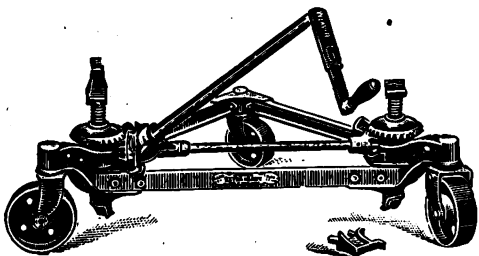


FIG. 1354

These jacks meet the greatest variety of requirements in the Garage, Paint Shop, Repair Shop, Auto Livery or wherever automobiles are to be handled. The garage size and the small car size are identical in principle and operation but because of its greater ability to withstand the rough usage and abuse of careless handling under all types of cars, we recommend the garage size jack for general service.

Meet every requirement. An equipment of these Jacks makes it possible to handle complete or dismantled cars with greatest convenience and with the greatest saving of both time and labor. With one of these Jacks under each axle, the car can be pushed directly sideways, turned completely around within its own length or manipulated in any other desired manner in a space no larger than the car itself occupies. As the Jacks are confined within the limits of the dimensions of the car, they are preferable to the ordinary turn table as they enable the car to be turned in any location in the garage.

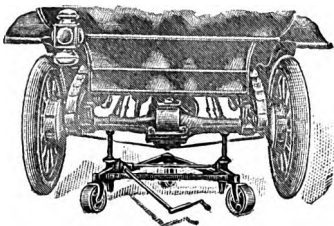


FIG. 1352

Fit front or rear axle. Weaver Auto Twin-Jacks of either size are designed to fit either front or rear axle of any car. An equipment of especially designed extension blocks is supplied with these Jacks for use in applying the Jack to the various types of rear axles equipped with truss rods. The garage size Auto Twin-Jack is capable of handling practically any work that will come into the average public garage. It is very ruggedly constructed and is equipped throughout with ball and roller bearings so as to permit the heavier burdens to be raised and transported with comparative ease.

Absolutely safe. The dependable screw hoisting mechanism and the broad wheel base of these jacks constitute an absolutely safe and secure foundation for the dismantled car. There is no possibility of the jacks turning over as would be true with the ordinary standard type of jack.

Construction. The general construction of both types of Auto Twin-Jacks is of high carbon steel and malleable iron. The wheels and some of the gears are of gray iron to provide highest wearing qualities. The general operations of the two types of Jacks as referred to above are identical. The following comparative table, however, will definitely illustrate the comparative strength.

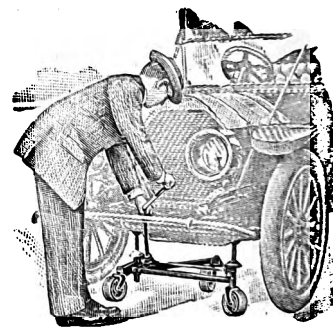


FIG. 1353

Extension Crank Handle. These Jacks operate by means of a long crank handle which can be operated from a convenient standing position and which provides a means of readily placing and holding the Jack in proper position under the car while the screws are being elevated to receive the load. The handle is provided with a convenient latch so that it may be supported at various angles when not in operation.

	Garage Size Jack.	Small Car Size Jack
Lifting capacity, pounds.....	8000	4000
Diameter of wheels, inches.....	7	4 1/4
Length of handle, inches.....	34	26
Diameter of screw, inches.....	1 1/4	1 1/8
Shipping weight (each) pounds.....	100	50
Price, each.....	\$39.00	\$22.80

WEAVER BODY EXTENSION

FOR GARAGE SIZE AUTO TWIN-JACKS

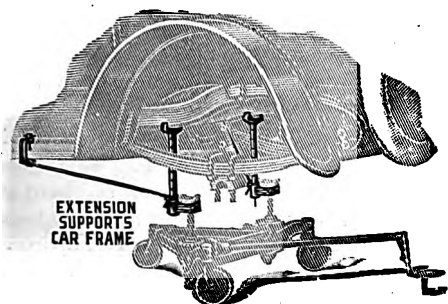


FIG. 1356

This "Body Extension" is designed to attach securely to the raising screws of the Weaver Garage Size Auto Twin-Jacks for the purpose of supporting an automobile from the frame bolsters, instead of from the axle.

Dismantled cars can be easily moved with the body supported in this manner. Either or both axles may be removed

and the car rolled to an out-of-the-way place in the shop while the necessary repairs are being made upon the axles. No more cars propped up on boxes obstructing the floor space in front of the work bench.

Full Adjustments—The Extension can be quickly attached and adjusted to fit any width frame from 24 to 36 inches. The height has a convenient pin adjustment every $1\frac{1}{2}$ inches with a range of from 18 to 40 inches.

Construction—The Clamps are very strongly designed. The inside jaws of the clamps are threaded to fit snugly into the threads of the heavy Jack screws so as to prevent slipping. The clamps are securely tightened by heavy bolts. The extension arms are made of solid steel shaft $1\frac{1}{8}$ inches in diameter and the heavy clamp jaws are made of cast steel. The brace rod extends forward from each clamp and is securely attached to the running board of the car on either side by means of a heavy screw clamp. This securely supports the attachment while the car is being transported. Shipping weight, 25 lbs.

List Price (complete)..... \$16.00

WEAVER AUTO AMBULANCE

FOR TOWING DISABLED AUTOMOBILES

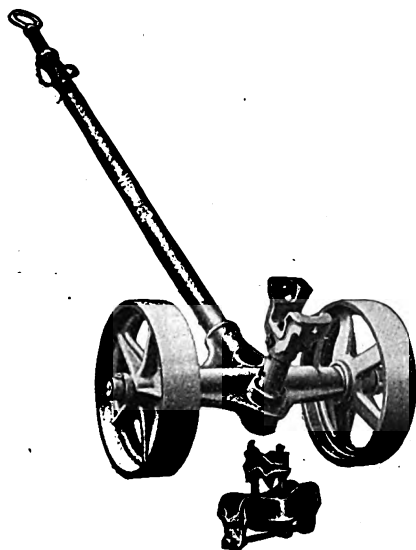


FIG. 1367

The Weaver auto ambulance is the only thoroughly practical and universal device ever perfected for pulling disabled cars into the repair shop. Readily attached to either axle of the car; easily handled by one man; quickly adjusted to meet every contingency; comparatively light, but amply strong; telescoping tongue.

ATTACHES TO EITHER AXLE

Every provision has been made for readily adjusting the Ambulance to either the front or rear axle of any car, as shown in cuts opposite. The height of the standard may be varied as conditions demand by a heavy pin or key and the length of the tongue may be varied at will from seven feet to thirteen feet.

Cars can't bounce or slip—Ample provision is made for securing the axle of the car firmly to the Ambulance so as to

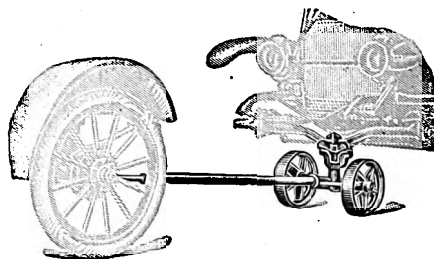


FIG. 1355

prevent any play at the connection. This is vitally important.

Cast steel wheel—The wheels are of cast steel and very strongly designed. They are 14 inches in diameter with 3 inch face. Can be used on country roads with entire satisfaction. Broad Roller Bearings permit heaviest loads to be towed with little energy.

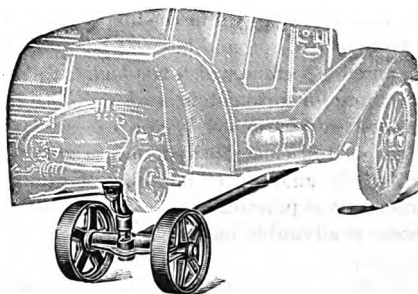


FIG. 1358

General Construction—The construction throughout is extremely strong but designed so as to eliminate all unnecessary weight. The telescoping tongue is of double strength steel tubing; $1\frac{1}{4}$ inch steel axle extends entirely through the frame; malleable iron saddles; 20 inch tread; shipping weight, complete 145 pounds.

List price..... \$60.00

THE FRANKLIN PORTABLE CRANE AND HOIST

CAPACITIES 1, 1½, 2, 2½ AND 3 TONS

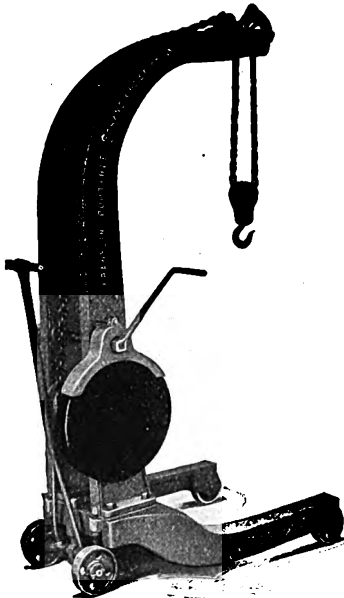


FIG. 1362

The Franklin Portable Crane and Hoist is designed for use in shops, factories, and all places where it is ever necessary to lift heavy bodies, or to transfer them from place to place and this with the least expenditure of time and labor and with safety.

It will lift and carry three tons and is easily handled by two men. Moreover, it is easily moved, and every point in the shop is accessible. Its great lifting capacity in conjunction with its portability makes it, in many cases, a great deal better than either an overhead crane or an industrial railway. However elaborately a shop is fitted with overhead cranes (whether electric or pneumatic), The Franklin Portable Crane and Hoist will be found a most important addition to its facilities.

It is worthy of note that the Franklin Cranes are now in use in the largest shops in the country. They satisfactorily meet requirements for which other appliances are not fitted.

The many uses for the Portable Crane and Hoist must be obvious. One man alone, with its help, can lift a large casting or any piece weighing up to two tons, and convey it to any part of the works and place it in or on a machine, or deposit it as may be required.

The Franklin Portable Crane and Hoist is ever ready; it goes anywhere, everywhere. It aids in reducing the expenditure of labor and time to the desired minimum.

SPECIFICATIONS AND PRICES

Size	A	1A	2A	3A	B	3B	C	3C	D	3D	E	3E	F
	ft. in.	ft. in.	ft. in.	ft. in.	ft. in.	ft. in.	ft. in.	ft. in.	ft. in.	ft. in.	ft. in.	ft. in.	ft. in.
Height of crane.....	6 6	6 6	7 6	7 6	8 4	8 4	9 5	9 5	9 6½	9 6½	11 4	11 4	12 10
Height of hoist.....	5 4	5 4	6 3	6 3	7 3	7 3	8 4	8 4	8 2	8 2	10 0	10 0	11 6
Width of bed, outside	2 8	2 8	2 11	2 10	3 2	3 2½	4 2½	4 2	4 6½	4 7	4 7	4 7	4 11
Width of bed, inside	2 1	2 1	2 3½	2 3	2 6½	2 7	3 7	3 6½	3 11½	4 0	4 0	4 0	4 4
Length of bed.....	3 2	3 2	3 5	3 5	3 11	3 11	3 11	4 1	4 11	4 11	4 11	4 11	5 1
Height of bed.....	12	6 ¾	12	6 ¾	12	6 ½	12	7	12	7	12	7	12
Overhang.....	2 4½	2 4½	2 7½	2 7½	2 8½	2 8½	2 11	2 11	3 11	3 11	3 11	3 11	4 1
Capacity, tons.....	1½	1½	2	2	2½	2½	3	3	3	3	3	3	3
Weight, pounds.....	665	665	800	785	1000	1000	1240	1240	1300	1300	1500	1500	1940
List Price.....	\$163.25	163.25	186.25	185.50	212.50	212.50	257.00	257.00	292.50	292.50	302.50	302.50	357.00

MANLEY PORTABLE FLOOR CRANES

CAPACITIES ½, 1 AND 2 TONS

These cranes are especially designed for garage use. Their application to all kinds of work in garage and shop is unlimited, as they not only lift the load but transport it. They have a superstructure of structural steel, cantilever bridge design (lightness and strength). There is no excessive weight up in the air to make them top heavy. This, in conjunction with a combination cast iron and heavy I-beam base, brings the center of gravity down to floor, making possible a crane which has high lift, deep overhang, light weight so absolutely essential in a crane for automobile work. Roller bearing wheels. Due to this construction these cranes are not unwieldy and excessively and unnecessarily heavy. One man can raise a load of full capacity and then is able to move crane by himself. The ½-ton crane is particularly adapted to handling the lighter cars, such as Ford, Maxwell, etc. The 1-ton crane covers practically the whole range of passenger cars and light truck work. The 2-ton crane is advisable for the heavier passenger cars and trucks.

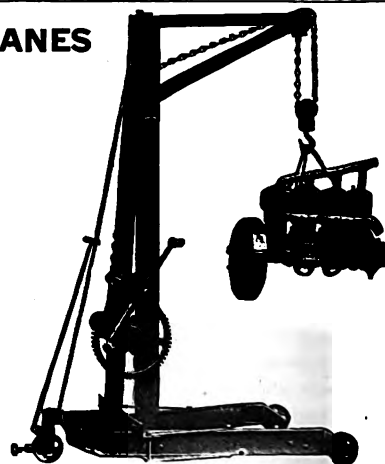


FIG. 4082

SPECIFICATIONS AND PRICES

Number	50	61	62	63	72	73
	ft. in.	ft. in.	ft. in.	ft. in.	ft. in.	ft. in.
Lift from floor.....	6 0	6 6	7 0	7 6	7 0	7 6
Width of base.....	32	36	36	36	40	40
Height of base.....	6	6	6	6	8	8
Overhang.....	30	35	35	35	38	38
Capacity, tons.....	½	1	1	1	2	2
Weight, pounds.....	300	500	515	525	750	770
List Price.....	\$111.65	162.65	170.35	177.80	229.90	240.60

MANLEY GENERAL UTILITY GARAGE CRANES

These cranes are constructed of steel throughout except the gearing, which is of cast iron and the base which is seasoned white oak.

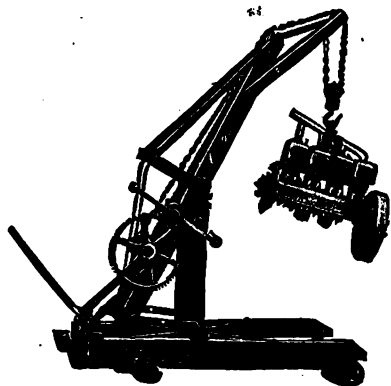


FIG. 4083

COMBINED PORTABLE FLOOR AND WRECKING CRANE

NO. 100

FOR ALL LIFTING WORK INSIDE THE GARAGE AS A PORTABLE CRANE

The Manley General Utility Garage Crane in its complete form with portable base combines a portable floor crane and wrecking crane having the essential requirements of a garage crane—deep overhang 36 inches, high lift 7 feet, low base, light weight, with lifting capacity of $1\frac{1}{2}$ tons. Weight 500 pounds.

Price.....\$197.80

WRECKING CRANE FOR MOUNTING ON TRUCK

NO. 101

FOR ALL OUTSIDE WRECKING, TOWING AND LIFTING

This Crane is exactly the same construction as the Combined Floor and Wrecking Crane but is furnished without the portable base for mounting on a service car. Due to the four unit construction two men can take it down and put it together again in five minutes making it possible to be taken apart and into the country in a touring car, if no service car is available. As a wrecking crane only it has an overhang of beam 42 inches, requires space 36 inches by 24 inches and has a lifting capacity of 2 tons. Weight, 400 pounds.

Price.....\$176.50

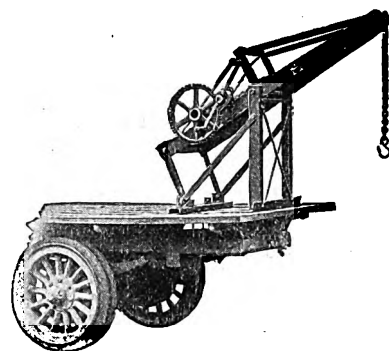


FIG. 4084

WEAVER AUTO HOIST

The peculiar design of this hoist permits it to be operated in very cramped quarters. It can be run into position over a car in a crowded shop without requiring more than 12 to 14 inches space on either side of the car. Note particularly the unobstructed space under the car, allowing ample room for two or more mechanics to work with absolute freedom. The frame is designed so as to permit the height of the arch to be increased approximately 12 inches allowing the uprights to be raised to the desired height in the braces on either side, by means of the chain hoist. This increased height enables the hoist to raise the rear end of a limousine or a touring car with the top up, for removing the rear system. One chain of the hoist may be carried over the pulley in the center of the frame for performing work which can be handled to better advantage by a single suspension than by a double suspension from each corner of the frame as shown in illustration. The hoisting mechanism is operated by worm drive which is absolutely safe and positive. There are no gears nor ratchets to slip or break and allow the load to fall. Hoist is carried upon four ball and roller bearing casters 5 inches in diameter which permit it to be transported with perfect ease. The construction throughout is of steel, giving the greatest possible strength in comparison with its height. Height, 8 feet to 9 feet. Weight, 575 pounds.

List Price.....\$150.00

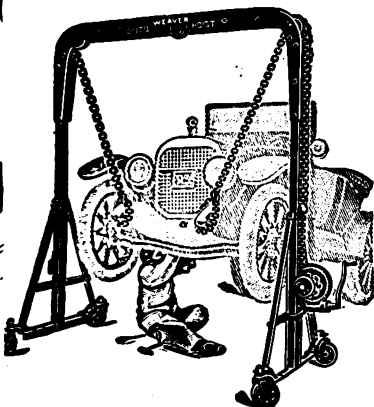


FIG. 4085

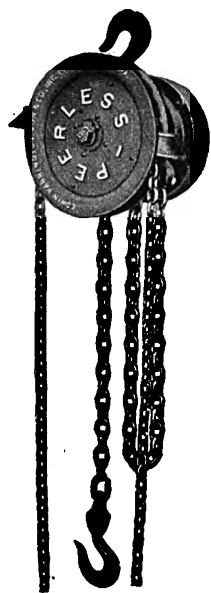


FIG. 1364
PEERLESS

HARRINGTON CHAIN HOISTS

THE THREE LEADING BLOCKS

THEY EXCEL ALL OTHERS IN DESIGN, DURABILITY AND WEARING QUALITIES.

THE PEERLESS. FOR FAST SPEED AND HIGH EFFICIENCY.

THE SCREW. FOR SIMPLICITY AND ROUGH USAGE.

THE DIFFERENTIAL. FOR OCCASIONAL USE NOT DEMANDING HIGH EFFICIENCY.

THE PEERLESS HOIST, SPUR GEARED

The Peerless Hoist is designed and built to give the most satisfactory service possible to all users. Its construction embodies the latest developments in practical chain hoist design, covering strength, light weight, ease of operation and protection against wear.

For stationary, portable or overhead crane work, whether in the shop, warehouse or outdoors, it cannot be equaled in any respect by hand equipment, and compares favorably with power hoists, considering cost of installation and maintenance. Being made in thirteen different capacities and any height of lift desired, there is a size for any load.

A feature which will appeal to all users, is the single load chain on all sizes up to and including the six thousand pound block. On those of greater capacity, the arrangement of the sheaves has been made as compact as possible, and the number of chains in the way of the operator has been materially lessened.

Extra high efficiency in chain hoists is only desirable when it does not shorten the life of the hoist. The Peerless has an efficiency of eighty per cent. without resorting to the use of roller bearings, which soon wear out, due to the small size and enormous working pressures.

The pull exerted on the hand chain by the operator is transmitted, without loss of power, to the load wheel, through a simple balanced train of spur gears, having teeth accurately cut from drop forged steel blanks. The teeth on the central pinion are unusually strong, and are heat treated to prevent wear.

The sustaining mechanism is a special patented feature, used only on these hoists. In raising a load, this friction brake revolves with the pinion shaft without waste of energy; but, when hoisting ceases, it is automatically and positively locked to hold the load until again moved by the operator. It is entirely noiseless at all times, and the lock is in engagement ready to operate at any time, a feature not found in any other hoist.

In many cases it is desirable to lift light loads at much faster speed than is attainable with the regular gearing. To accomplish this the "Quick Speed Peerless" is furnished with gears of a higher ratio. Since the pull on the hand chain is increased in direct ratio to the speed of the gearing it is advisable not to handle more than one-half the rated load for continued lifting.

THE DIFFERENTIAL HOIST

The Differential Hoist has been on the market longer and is probably better known to the general users of hoists than any other style. It is a simple, cheap and safe type of chain hoist, and is highly desirable where the use is only occasional and high efficiency is not required. There are no parts to get out of order, which makes it particularly adapted for use on outdoor jobs.

The chain on this style of hoist is endless, passing around the lower and two upper sheaves. The load is always held at any point, as the difference in the diameter of the double upper

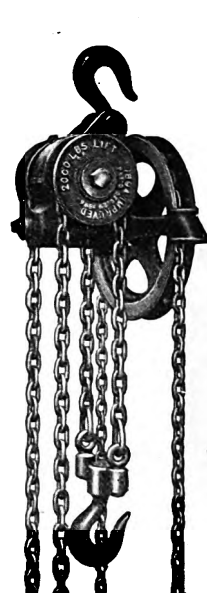


FIG. 1365
SCREW



FIG. 1366
DIFFERENTIAL

sheaves, which have one more pocket on one side than the other, is too small to overbalance the friction of the parts.

The utmost care is taken in the manufacture of both the chain and the sheaves so that they fit correctly. Although low in price, the same care is exercised in their manufacture as in making the Harrington Peerless Screw Hoist, and all parts will readily interchange.

THE IMPROVED SCREW HOIST

The Harrington Screw Hoist has a reputation for superiority gained through many years of satisfactory service. Although not quite so fast as the Peerless, it is compact, powerful and convenient, and is built to stand the wear and tear of hard usage.

It has been adopted by the United States Government, and is in use in all progressive shops, rolling mills and manufacturing plants. It is everywhere recognized as the standard hoist of the world.

The worm gear, formerly of iron, is now made of bronze with square hubs, and is driven by a steel worm.

The load wheels have square holes fitting squared hubs on the worm gear instead of clutches, thus increasing the strength and avoiding the liability of breaking. They are also reversible; when one side of the pockets become worn, the wheels can be taken off and turned around, bringing the good side of the pockets into action.

The load is carried on two distinct chains, either of which has more than sufficient strength to lift a load up to the full rated capacity of the hoist. The possibility of accident is thus greatly reduced.

The load chain hook has swivel connections, so that any twist of the chain may be straightened without removal.

A thrust screw and bronze washer are placed at the end of the worm, instantly adjustable, to obtain fast or slow speed in lowering, as is desirable in some cases.

The worm and worm gear are enclosed in a new and improved, closely fitted, oil tight case or housing; the working parts are thus always immersed in oil, insuring smooth action and thorough lubrication. A hard grease of special manufacture is used for the worm and worm gear, which is better than oil and lasts longer.

A new and improved hand chain guard is so placed that the operator can stand clear of the load, without wasting labor by dragging the chain in the guard. The old style guard will be furnished if specified.

PRICES AND DATA ON HARRINGTON HOISTS

PEERLESS

Capacity, in pounds	Regu- lar lift, in feet	Price of Hoist, Regular Lift	Price of Extra Lift, per foot	Distance Between Hooks		Weight of Hoist (Reg- ular Lift) in pounds		Size of Box, in inches	Pull on hand chain to lift full load, in pounds	Feet of chain handled to lift load one foot	Num- ber of Strands of load chain	
				Shortest inches	Reach (Reg. Lift)	Net	Gross (Boxed)					
500	8	\$60.00	\$1.70	13"	9' 1"	48	70	15x12½x11	50	14.0	1	REGULAR STYLE
1000	8	70.00	1.80	14"	9' 2"	62	74	15x12½x11	64	20.3	1	
2000	8	90.00	1.90	16"	9' 4"	84	100	18x16½x12	81	31.5	1	
3000	8	120.00	2.00	19"	9' 7"	115	151	20x16x13½	114	34.5	1	
4000	9	140.00	2.10	22¼"	10' 10¼"	157	196	21x18x15	124	40.5	1	
6000	10	180.00	2.50	24"	12' 0"	236	314	28x23x15	130	59.0	1	
8000	10	220.00	3.20	29"	12' 5"	230	290	25x21x15	128	81.0	2	
10000	12	280.00	4.00	32"	14' 8"	352	451	32x27x15	112	118.0	2	
12000	12	330.00	4.00	34½"	14' 10½"	359	458	32x27x15	134	118.0	2	
16000	12	400.00	5.50	39¾"	15' 3¾"	460	595	44x30x15	125	177.0	3	
20000	12	480.00	6.40	42"	15' 6"	533	659	44x30x16	181	154.5	3	
30000	12	680.00	9.20	55¼"	16' 7¼"	995	1275	48x36x18	208†	103.0†	4	
40000	12	850.00	12.80	62¼"	17' 2¼"	1260	1560	55x46x23	186†	154.5†	6	
500	8	60.00	1.70	13"	9' 1"	48	65	15x12½x11	47.6*	7.5	1	QUICK SPEED
1000	8	70.00	1.80	14"	9' 2"	62	72	15x12½x11	65.9*	10.0	1	
2000	8	90.00	1.90	16"	9' 4"	84	100	18x16½x12	85.9*	16.8	1	

* Pull is given to raise only one-half the rated load on Quick Speed Hoists.

† On each of two hand chains.

SCREW

Capacity, in pounds	Regu- lar lift, in feet	Price of Hoist, Regular Lift	Price of Extra Lift, per foot	Distance Between Hooks		Weight of Hoist (Regular Lift), in pounds		Size of Box, in inches	Pull on hand chain to lift full load, in pounds	Feet of chain handled to lift load one foot	Num- ber of Strands of load chain
				Shortest inches	Reach (Reg. Lift)	Net	Gross (Boxed)				
500	8	\$45.00	\$2.20	14½"	9' 2½"	43	65	17½x14½x10	20	64.0	2
1000	8	50.00	2.40	17"	9' 5"	71	103	20 x18 x12	49	60.5	2
2000	8	60.00	2.60	18"	9' 6"	78	110	20 x18 x12	71	76.0	2
3000	8	80.00	2.80	19"	9' 7"	111	151	22 x21½x13	99	88.5	2
4000	9	100.00	2.88	22"	10' 10"	167	224	26 x24½x17	129	93.5	2
6000	10	150.00	3.00	30"	12' 6"	250	346	33 x28 x19	163	96.0	2
8000	10	190.00	3.40	32"	12' 8"	329	447	36½x32½x19½	190	128.0	2
10000	12	280.00	4.40	39"	15' 3"	480	632	32 x21 x32	293	103.0	2
12000	12	360.00	5.00	39½"	15' 3½"	557	697	32 x21 x32	293	110.0	2
16000	12	420.00	5.80	41"	15' 5"	751	876	32 x23 x32	403	148.0	2
20000	12	550.00	5.80	47"	15' 11"	789	930	32 x23 x32	358	198.0	2
30000	12	680.00	10.20	51¾"	16' 3¾"	1159	1431	45 x27 x33	424	296.0	4

THE DIFFERENTIAL

Capacity in Pounds	Regu- lar lift, in feet	Price of Hoist, Regular Lift	Price of Extra Lift, per foot	Distance Between Hooks		Weight of Hoist (Regular Lift), in pounds		Size of Box, in inches	Pull on hand chain to lift full load, in pounds	Feet of chain handled to lift load one foot	Num- ber of Strands of load chain
				Shortest inches	Reach (Reg. Lift)	Net	Gross (Boxed)				
500	6	\$36.00	\$5.60	17	7' 5"	22	34	16 x 9½x 6½	72	18	2
1000	7	42.00	5.60	21	8' 9"	31	41	16 x 9½x 6½	122	24	2
2000	8	56.00	6.00	26	10' 2"	50	60	19½x11½x 7½	216	30	2
3000	8½	72.00	6.40	32	11' 2"	80	97	24½x14½x 8	246	36	2
4000	9	90.00	6.80	39	12' 3"	130	156	30 x17½x 8½	308	42	2
6000	10	120.00	8.00	44	13' 8"	178	215	28½x19½x11	557	38	2

REPAIR PARTS FOR HARRINGTON HOISTS

Parts for Harrington Hoists are all made to standard gauge to interchange with the least possible inconvenience. In ordering it is necessary to specify: The Type of Hoist or Traveler; Capacity; Name and List Number of part wanted. In ordering Load Chain, care should be taken to specify whether the chain only, or chain complete with bottom hook and swivel are desired. Either specify the "Lift" of hoist for which it is wanted, or the total lineal feet in the old chain. If the old hook is sent with the order (charges prepaid) it will be attached to the new chain without charge. Owing to processes of manufacture, some parts are not sold separately, such as, Case and Cap and Worm Gear and Hub for 1894 Model Screw Hoist.

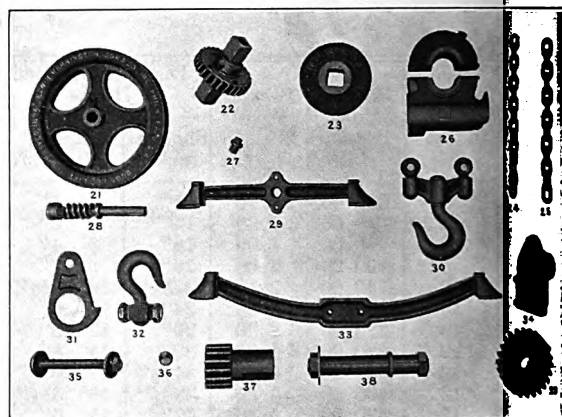


FIG. 1367
PARTS OF IMPROVED SCREW HOISTS

LINEAL FEET OF CHAINS ON REGULAR LIFT HOISTS AND TRAVELERS

Capacity in pounds	Feet of Load Chain				Feet of Hand Chain				
	Peerless	Screw	Keystone	Differ- ential	Peerless	Screw	Keystone	1-Beam Trav.	Flat Rail Trav.
500	9	18		22	17	17			19
1000	9	18 $\frac{3}{4}$	18 $\frac{3}{4}$	26	17	17	17	18	19
2000	9	18 $\frac{3}{4}$	18 $\frac{3}{4}$	30	17	17	17	18	20
3000	9 $\frac{1}{2}$	18 $\frac{3}{4}$	18 $\frac{3}{4}$	33	18	18	18	19	20
4000	10 $\frac{1}{2}$	21	21	36	20	20	20	21	22
6000	11 $\frac{1}{2}$	24	46	38	22	22	22	23	24
8000	23	24	46		22	23	22	23	24
10000	27	29	56		26	28	27	28	
12000	27	29	81		26	29	28	29	
16000	40 $\frac{1}{2}$	29	84		27	29	28	29	
20000	40 $\frac{1}{2}$	29	84		27	29	28	29	
30000	60	58	150		*33	29	30		
40000	92				*33				

Sizes above heavy line have load hook and yoke attached direct.

Those below the line use a bottom sheave.

*Feet of chain on each hand wheel.

REPAIR PARTS FOR HARRINGTON IMPROVED SCREW HOISTS MODEL OF 1894 500 TO 30,000 LBS. CAPACITY

List No.	Name	500	1000	2000	3000	4000	6000	8000	10000	12000	16000	20000	30000
21	Hand Wheel	\$2.00	\$3.00	\$3.00	\$5.00	\$5.60	\$10.00	\$14.00	\$16.00	\$23.00	\$24.00	\$24.00	\$24.00
22	Worm Gear and Hub	6.00	6.40	8.00	10.00	12.00	14.00	18.00	32.00	33.00	46.00	46.00	46.00
23	Load Wheels (2)	3.20	3.60	4.00	6.00	7.00	12.00	17.00	21.00	30.00	36.00	36.00	36.00
24	Hand Chain, per foot	.50	.50	.50	.50	.50	.50	.60	.70	.70	.70	.70	.70
25	Load Chain, per foot	.60	.70	.80	.90	.94	1.00	1.10	1.50	1.80	2.20	2.20	2.20
26	Case and Cap	3.00	4.00	5.00	8.00	11.00	19.00	22.00	32.00	32.00	40.00	40.00	40.00
27	Thrust Screw	.60	.80	.80	1.00	1.20	3.00	3.00	4.00	4.00	4.00	4.00	4.00
28	Worm	2.00	3.00	3.00	5.00	6.40	13.00	14.00	24.00	24.00	32.00	32.00	32.00
29	Hand Chain Guard	1.40	1.80	1.80	2.40								
30	Bottom Hook and Swivel	3.40	4.00	5.20	7.00	8.20	10.40	22.00	27.00	39.00	46.00	70.00	88.00
31	Side Plates (2)	1.20	1.60	1.80	2.60	3.60	8.00	12.00	20.00	20.00	28.00	28.00	60.00
32	Top Hook and Swivel	3.40	4.00	5.20	7.00	8.20	10.40	22.00	27.00	39.00	46.00	70.00	88.00
33	Hand Chain Guard					3.00	4.00	6.00	8.00	14.00	16.00	16.00	16.00
34	Gland					4.00	6.00	7.00	10.00	10.00	12.00	12.00	12.00
35	Center Bolt and Washers	.60	.80	1.00	1.10	1.20	2.00	3.00	5.00	5.00	6.00	6.00	6.00
36	Thrust Washer	.40	.40	.40	.50	.60	1.00	1.00	2.00	2.00	2.00	2.00	2.00
37	Pinion										10.00	10.00	10.00
38	Stud										6.00	6.00	6.00
39	Gear										10.00	10.00	10.00
45	Lower Idler Wheels (2)												20.00
46	Lower Idler Chain Guide												8.00
47	Load Chain Guide and Stripper												8.00
	Hand Chain, Regular Lift	8.50	8.50	8.50	9.00	10.00	11.00	13.80	19.60	20.30	20.30	20.30	39.20
	Load Chain, Regular Lift with Hook and Swivel	14.20	17.12	20.20	23.88	27.94	34.40	48.40	70.50	91.20	109.80	109.80	220.00

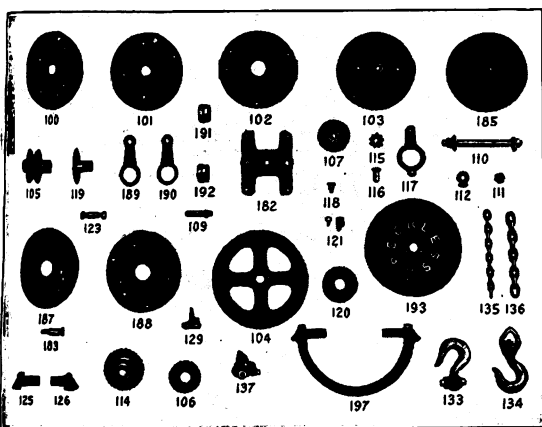


FIG. 1368

REPAIR PARTS FOR HARRINGTON PEERLESS HOISTS

500 TO 40,000 LBS. CAPACITY

SEE OTHER LIST ON PAGE FOLLOWING

List No.	NAME	.500	1000	2000	3000	4000	6000	8000	10000 to 40000
100	Back Frame.....	\$3.00	\$3.00	\$4.00	\$6.00	\$8.00	\$11.20	\$8.00	\$11.20
101	Front Frame.....	3.00	3.00	4.00	6.00	8.00	11.20	8.00	11.20
102	Front Cover.....	2.40	2.40	3.40	4.80	6.40	8.80	6.40	8.80
103	Back Cover a.....	2.00	2.40	3.40	4.80	6.40	8.80	6.40	8.80
104	Hand Wheel.....	3.20	3.20	4.60	6.00	8.30	10.60	7.20	10.60
105	Load Wheel*.....	1.80	2.40	3.80	4.80	5.60	7.60	5.60	7.60
106	Main Gear*.....	3.20	3.20	4.20	7.20	8.20	10.00	8.20	10.00
107-8	Intermediate Gear and Pinion, each*†	2.00	2.40	3.00	4.20	3.20	5.40	4.80	5.40
109	Intermediate Pinion Stud, each.....	.80	.80	1.00	1.40	1.60	2.00	1.60	2.00
110	Driving Pinion and Shaft, complete.....	4.00	5.40	6.80	8.60	10.20	12.00	10.20	12.00
112	Check Washer*.....	.60	.60	.80	1.00	1.20	1.40	1.20	1.40
114	Ratchet Disk*.....	2.00	2.00	2.80	3.00	3.40	4.00	3.40	4.00
115	Ratchet Pinion*.....	.80	.80	.80	.80	.80	.80	.80	.80
116	Ratchet Pinion Stud*.....	.60	.60	.60	.60	.60	.60	.60	.60
117	Ratchet Pinion Carrier Arm*.....	1.00	1.00	1.00	1.00	1.20	1.40	1.20	1.40
118	Ratchet Pinion Carrier Stud*.....	.60	.60	.60	.60	.60	.60	.60	.60
119	Friction Disk*.....	2.40	2.40	4.00	5.60	7.60	9.00	7.60	9.00
120	Leather Washer*.....	.80	.80	1.20	1.40	1.60	1.80	1.60	1.80
121	Friction Lock and Bolt.....	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
123	Connecting Stud and Nuts.....	.80	.80	1.00	1.40	1.60	1.80	1.60	1.80
125	Hand Chain Guards, pair.....	1.60	1.60	1.80	2.60	3.00	3.40	3.00	3.40
127	Load Chain Guide.....	1.00	1.00	1.20	1.60	1.80	2.00	1.80	2.00
129	Stripper*.....	.60	.60	.80	1.20	1.60	1.80	1.60	1.80
31	Hook only*.....	1.60	2.00	2.60	3.40	4.00	5.20	.....	.....
33	Top Hook and Swivel.....	3.40	4.00	5.20	7.00	8.20	10.40	.....	.....
34	Bottom Hook and Swivel.....	3.40	4.00	5.20	7.00	8.20	10.40	.....	.....
35	Hand Chain, per ft.....	.50	.50	.50	.50	.50	.50	.....	.....
36	Hand Chain, complete, regular lift.....	8.50	8.50	8.50	9.00	10.00	11.00	.....	.....
82	Load Chain, per ft.....	.70	.80	.90	1.00	1.10	1.50	.....	.....
83	Load Chain, complete, with Hook, regular lift.....	9.70	11.20	13.30	16.34	19.76	27.66	.....	.....
85	Gear Spider a.....	1.00	1.00	1.20	1.60	2.00	3.00	.....	.....
87	Gear Spider Stud, each.....	.20	.20	.20	.20	.30	.30	.....	.....
88	Gear Cover a.....	1.40	1.60	1.80	2.60	3.40	4.80	.....	.....
89	Back Frame.....	2.60	2.60	3.40	5.20	7.00	9.60	.....	.....
90	Front Frame.....	2.60	2.60	3.40	5.20	7.00	9.60	.....	.....
91	Back Hanger.....	1.00	1.00	1.40	1.80	2.20	3.00	.....	.....
92	Front Hanger.....	1.00	1.00	1.40	1.80	2.20	3.00	.....	.....
93	Back Hanger Bushing.....	.60	.60	.80	1.00	1.20	1.60	.....	.....
94	Front Hanger Bushing.....	.60	.60	.80	1.00	1.20	1.60	.....	.....
95	Handwheel Steel Plate.....	3.20	3.20	4.60	6.00	7.20	10.60	.....	.....
97	Loop Chain Guard.....	3.20	3.20	3.60	5.20	6.00	6.80	.....	.....

*Also used in Peerless Trolley Hoists.

†Parts 107 and 110 must be so specified when wanted for "quick speed" hoists.

*Must be specified whether right or left hand.

aSteel cover and spider interchange with old style back cover.

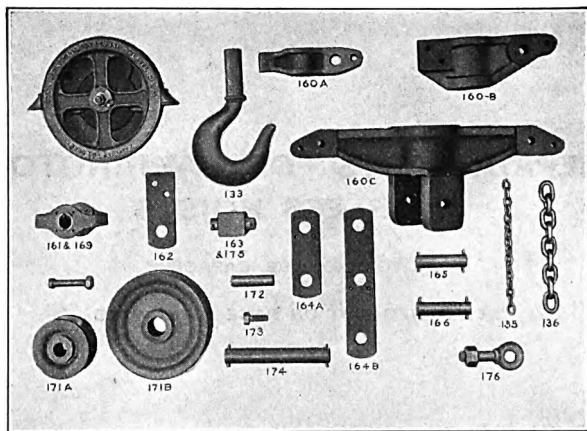


FIG. 1369

REPAIR PARTS FOR HARRINGTON PEERLESS HOISTS

8000 TO 40,000 LBS. CAPACITY

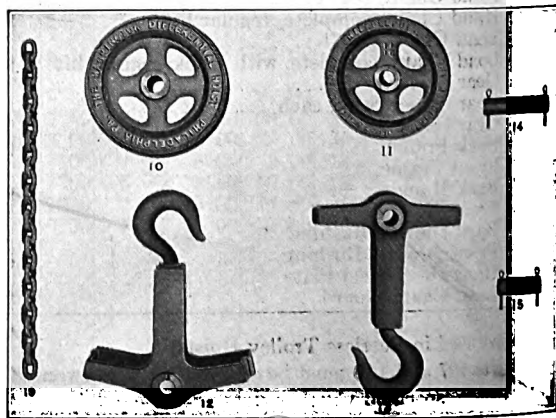
SEE OTHER LIST ON PRECEDING PAGE

List No.	Name	8000	10000	12000	16000	20000	30000	40000
	Main Block.....	\$102.00	\$130.00	\$130.00	\$130.00	\$130.00	\$130.00	\$130.00
	Top Yoke, Complete..	39.00	59.00	71.00	125.00	147.00	184.40	252.40
133	Top Hook.....	17.00	21.00	33.00	38.00	54.00	64.00	100.00
160-A	Top Yoke.....	18.00	34.00	34.00	.....	.....	.....	.....
160-B	Top Yoke.....	.....	.....	.....	52.00	52.00	.....	.....
160-C	Top Yoke.....	.....	.....	.....	.....	.....	70.00	84.00
162	Side Plates, each.....	.....	.....	.....	5.00	6.00	8.00	10.00
166	Top Pin and Cotters.....	.....	.....	.....	5.00	6.00	7.00	8.00
169	Guard Yoke.....	.....	.....	.....	7.00	8.00	9.00	10.00
170	Side Plate Bolt.....	.....	.....	.....	1.00	1.00	.....	.....
171-A	Top Sheave.....	.....	.....	.....	9.00	11.00	.....	.....
171-B	Top Sheave.....	.....	.....	.....	.....	.....	12.00	12.00
172	Top Yoke Pin.....	2.00	2.00	2.00	2.00	2.00	2.00	2.00
173	Side Plate Cap Screws.....	.....	.....	.....	.....	.....	.20	.20
174	Side Plate Pin.....	.....	.....	.....	.....	.....	2.00	2.00
	Bottom Block, Complete.....	46.00	58.00	70.00	91.00	124.00	147.00	219.00
133	Bottom Hook.....	17.00	21.00	33.00	38.00	54.00	64.00	100.00
135	Hand Chain, per foot.....	.50	.50	.50	.50	.50	.50	.50
136	Load Chain, per foot.....	1.10	1.50	1.50	1.50	1.80	1.80	1.80
161	Bottom Guard Yoke.....	5.00	7.00	7.00	7.00	8.00	10.00	11.00
163	Bottom Swivel.....	5.00	6.00	6.00	8.00	16.00	24.00	40.00
133 }								
163 }	Bottom Hook and Swivel.....	22.00	27.00	39.00	46.00	70.00	88.00	140.00
164-A	Side Plates, each.....	4.00	5.00	5.00	.....	.....	10.00	12.00
164-B	Side Plates, each.....	.....	.....	.....	8.00	9.00	.....	.....
165	Bottom Sheave Pin.....	4.00	5.00	5.00	5.00	6.00	7.00	8.00
171-A	Bottom Sheave.....	7.00	9.00	9.00	9.00	11.00	.....	.....
171-B	Bottom Sheave.....	.....	.....	.....	.....	.....	12.00	12.00
175	Cross Bar.....	.....	.....	.....	6.00	9.00	.....	.....
176	Eye Bolt and Nut.....	.....	.....	.....	2.00	2.00	.....	.....
	Hand Chain, each, complete, reg. lift.....	11.00	13.00	13.00	13.50	13.50	16.50	16.50
	Load Chain, complete, regular lift.....	25.30	40.50	40.50	60.76	72.90	108.00	165.00

REPAIR PARTS FOR HARRINGTON DIFFERENTIAL HOISTS

500 TO 6000 LBS. CAPACITY

List No.	Name	Pounds					
		500	1000	2000	3000	4000	6000
10	Top Sheave.....	\$ 7.20	9.60	12.00	16.80	24.00	31.20
11	Bottom Sheave.....	1.80	2.60	3.00	3.80	4.50	7.50
12	Top Yoke and Hook.....	6.00	7.50	9.00	11.00	15.00	22.00
13	Bottom Yoke and Hook.....	4.50	6.00	7.50	9.00	11.00	16.00
14	Top Pin.....	.80	1.00	1.00	1.20	1.20	1.40
15	Bottom Pin.....	.60	.80	.80	1.00	1.00	1.20
19	Chain, per foot.....	1.40	1.40	1.50	1.60	1.70	2.00
	Regular Chain, complete.....	21.00	25.00	34.00	43.00	54.00	72.00



YALE & TOWNE CHAIN BLOCKS



FIG. 5004
DIFFERENTIAL



FIG. 5005
SCREW-GEARED

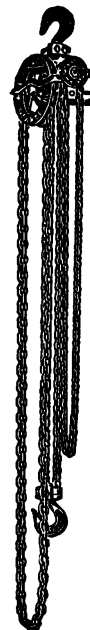


FIG. 5006
SPUR-GEARED

DIFFERENTIAL

The Yale Differential Block is an occasional service block, where comparatively light loads are to be handled at rare intervals. The overhaul of hand chain compares with the Spur-Geared, but the hand chain pull is very hard. The Block, however, is light, easily handled and where men are available for emergency or occasional work, especially in the smaller sizes, it is a desirable block.

SCREW-GEARED

Where the higher speed of the Spur-Geared is not required, the Screw-Geared Block is the one to recommend. It is adapted for portable use, being light, powerful, durable and requiring the least head-room. The Screw-Geared is not as efficient as the Spur-Geared. It is, however, lighter and uses less head-room. It operates with a light chain-pull, but the large amount of overhaul of the hand chain to lift the load makes it slow in operation. It is essentially a block for riggers, for temporary and occasional service, a block that may be readily shifted to meet an emergency. It is also adapted to horizontal work when pulling heavy loads on rollers or kids.

SPUR-GEARED

The Spur-Geared works twice as fast as the Screw-Geared. It obtains its power through a balanced train of spur gearing, and has a high mechanical efficiency. It saves and utilizes the power which in blocks of other kinds is wasted in overcoming the friction relied on to sustain the load. This is accomplished by separating the sustaining from the hoisting mechanism. For easy lifting, these Blocks are faster than the others, considering the force which a man can exert continuously on the hand chain.

PRICES AND DATA DIFFERENTIAL

Capacity Pounds	Price		Regular Hoist feet	Minimum Distance between Hooks, inches	Chain Pull		Net Weight each lbs.
	Each complete	Extra Hoist, per ft.			lbs.	ft.	
500	\$ 36.00	\$4.80	6	17	72	18	22
1000	42.00	4.80	7	21	122	24	30
2000	56.00	5.00	8	26	216	30	51
3000	72.00	5.40	8½	32	246	36	81
4000	90.00	5.60	9	39	308	42	122
6000	120.00	6.00	9½	44	557	38	180

Each foot of extra hoist includes four feet of chain.

YALE & TOWNE CHAIN BLOCKS

PRICES AND DATA SCREW-GEARED

Capacity Pounds	Price		Regular Hoist feet	Minimum Dist. between hooks inches	Chain Pull		Net Weight each lbs.
	Each complete	Extra Hoist per ft.			lbs.	ft.	
1000	\$50.00	\$2.50	8	13	68	40	43
2000	60.00	2.60	8	16	87	59	57
3000	80.00	2.70	8	19	94	80	76
4000	100.00	2.80	9	21	115	93	104
6000	150.00	3.10	10	25	132	126	180
8000	190.00	3.80	10	29	142	155	215
10000	280.00	4.00	12	31	145	195	330
12000	360.00	5.60	12	33	145	252	340
16000	420.00	6.00	12	36	160	310	380
20000	550.00	6.40	12	45	160	390	560

Each foot of extra hoist includes two feet of chain.

SPUR-GEARED

Capacity Pounds	Price		Regular Hoist feet	Minimum dist. between Hooks inches	Chain Pull		Net Weight each lbs.
	Each complete	Extra Hoist per ft.			lbs.	ft.	
1000	\$ 70.00	\$1.80	8	15	62	21	53
2000	90.00	1.90	8	17	82	31	80
3000	120.00	2.00	8	19½	110	35	124
4000	140.00	2.10	9	24	120	42	188
6000	180.00	3.00	10	32	114	69	200
8000	220.00	3.20	10	37	124	84	290
10000	280.00	4.30	12	45	110	126	380
12000	330.00	4.30	12	46	130	126	390
16000	400.00	5.40	12	51	135	168	470
20000	480.00	6.50	12	57	140	210	570

Figures denote height in feet which blocks with regular lengths of chain will hoist above level on which operator stands. "Extra Hoist per foot" includes sufficient hand and load chain to increase the travel of the lower hook one foot.

REPAIR PARTS FOR YALE DIFFERENTIAL CHAIN BLOCKS

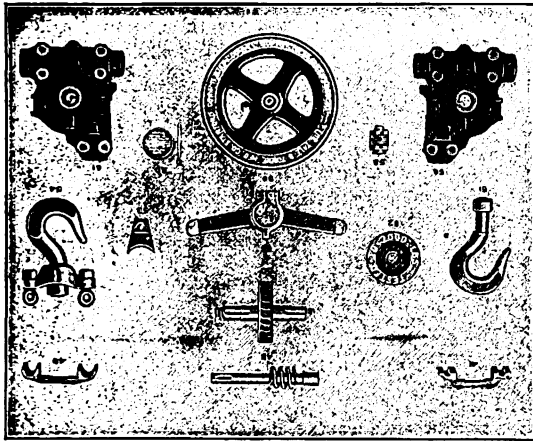


FIG. 1374

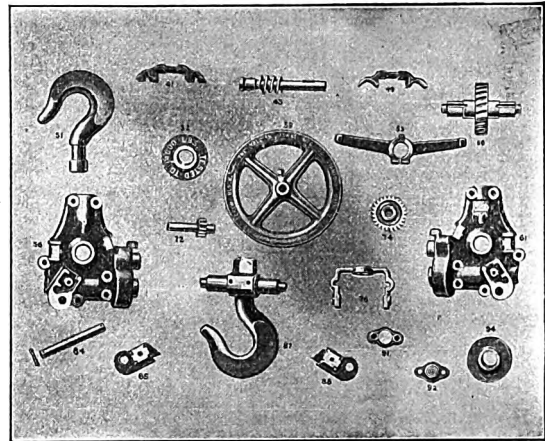
List No.	Name of Part	Capacity in Pounds					
		500	1000	2000	3000	4000	6000
11	Top Yoke and Hook.....	\$ 5.00	\$ 6.00	\$ 8.50	\$11.00	\$15.00	\$22.00
12	Top Sheave.....	6.25	8.00	12.00	16.80	24.00	31.20
13	Bottom Sheave.....	1.80	2.40	3.00	3.80	5.00	7.50
14	Bottom Yoke & Hook.....	4.00	5.00	7.00	9.00	12.00	16.00
15	Top Sheave Pin.....	.80	1.00	1.00	1.20	1.20	1.40
16	Bottom Sheave Pin.....	.60	.80	.80	1.00	1.00	1.20
	Regular Chain.....	26.40	31.20	37.50	44.60	50.40	57.00

REPAIR PARTS FOR YALE CHAIN BLOCKS

SCREW-GEARED



1000 TO 10,000 LBS.
FIG. 1375



12,000 TO 20,000 LBS.
FIG. 1376

List No.	Name	1000	2000	3000	4000	6000	7000	8000	10000	12000	14000	16000	20000
11	Load Chain Guide.....	\$0.80	\$1.00	\$ 1.20	\$ 1.40	\$ 2.00	\$ 2.40	\$ 2.80	\$ 3.20	\$ 3.40	\$ 3.60	\$ 3.80	\$ 5.00
15	Worm and Shaft.....	6.00	7.00	8.00	9.00	10.00	12.00	14.00	20.00	24.00	32.00	36.00	44.00
19	Load Chain Guard.....	.60	.80	1.00	1.20	1.40	1.60	1.80	2.00	2.20	2.40	2.60	2.40
20	Worm Wheel.....	7.00	8.00	10.00	12.00	14.00	18.00	22.00	30.00	32.00	36.00	40.00	50.00
21	Top Hook.....	2.00	2.80	3.60	4.80	6.00	8.00	10.00	12.00	14.00	16.00	24.00	30.00
22	Load Sheave, per pair.....	3.00	4.00	5.00	6.00	7.00	8.00	9.00	10.00	11.00	12.00	16.00	18.00
23	Strippers, per pair.....	.60	.80	1.00	1.20	1.40	1.60	1.80	2.00	.....	.....	.....	.....
24	Bottom Hook Swivel & Eye Bolts.....	4.00	5.00	6.00	7.00	9.00	10.00	12.00	16.00	.....	.....	.....	.....
25	Hand Chain Guide.....	1.80	2.00	2.60	3.60	4.00	4.80	5.20	5.60	6.00	6.00	6.00	8.00
26	Housing, each half.....	5.00	6.00	8.00	10.00	12.00	14.00	20.00	30.00	32.00	36.00	40.00	60.00
28	Friction Plug.....	2.40	2.80	3.40	4.00	.....	.....	.....	.....	.....	.....	.....	.....
29	Hand Wheel (see note below).....	3.00*	3.20*	5.00*	6.00*	7.00	8.00	9.00	10.00	10.00	10.00	13.00	14.00
30	Friction Plug Cover.....	.60	.60	.80	1.00	.....	.....	.....	.....	.....	.....	.....	.....
32	Pinion Shaft.....	.....	.....	.....	.....	8.00	8.40	8.80	9.20	9.60	10.00	10.40	12.00
34	Gear.....	.....	.....	.....	.....	3.20	3.60	4.00	4.40	4.60	4.80	5.00	6.00
36	Bottom Guides, per pair.....	.....	.....	.....	.....	.....	.....	.....	.....	9.00	10.00	12.00	14.00
38	Clevis Pin.....	.....	.....	.....	.....	.....	.....	.....	.....	1.00	1.20	1.40	2.00
39	Strippers, per pair.....	.....	.....	.....	.....	.....	.....	.....	.....	3.00	4.00	5.00	7.00
40	Bottom Hook Swivel & Eye Bolts.....	.....	.....	.....	.....	.....	.....	.....	.....	24.00	32.00	40.00	50.00
41	Friction Plug Cover.....	.....	.....	.....	.....	1.00	1.00	1.00	1.00	1.00	1.00	1.20	1.20
42	Friction Plug.....	.....	.....	.....	.....	5.00	6.00	7.00	8.00	8.40	8.80	9.20	10.80
43	Bottom Sheaves, per pair.....	.....	.....	.....	.....	.....	.....	.....	.....	6.00	8.00	12.00	14.00
44	Hand Chain, per foot*.....	.50†	.50†	.50†	.50†	.50	.80	.80	.80	.....	.....	.....	.....
45	Load Chain, per foot.....	.75	.80	.85	.90	1.00	1.10	1.10	1.20	1.00	1.10	1.10	1.20
46	Hand Chain, Welded, ft.....	.....	.....	.....	.....	.....	.....	.....	.....	.80	.80	.80	.80

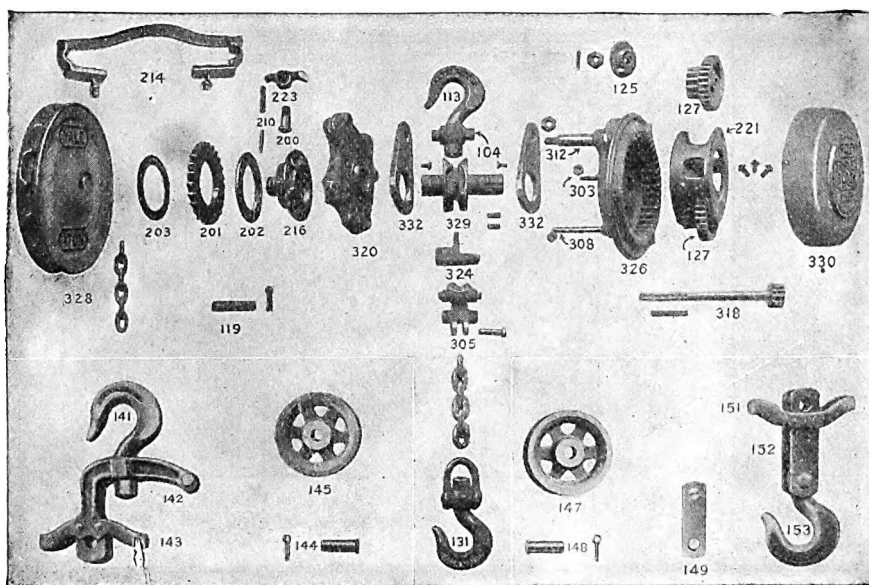
*In ordering Hand Wheels or Hand Chain note number of pockets for chain links in rim of wheel.

†Welded Hand Chain for Old Model Blocks, \$0.75 per foot for 1000, 2000, 3000 and 4000 lbs. sizes.

REPAIR PARTS FOR SPUR-GEARED BLOCKS—3 TONS AND LARGER. SEE CUT NEXT PAGE.

List No.	6000	8000	10000	12000	16000	20000	24000	32000	40000
341	\$ 6.00	\$10.00	\$12.00	\$14.00	\$24.00	\$30.00	\$48.00	\$64.00	\$130.00
342	12.70	28.60	33.20	40.00	50.00	56.00	64.00	80.00	128.00
143	.....	.....	9.60	14.00	16.00	18.00	20.00	23.00	26.00
144	.....	.....	2.00	3.00	4.00	5.00	7.00	8.00	11.00
145	.....	.....	6.00	9.00	10.00	11.00	11.00	11.00	11.00
147	6.00	6.00	6.00	9.00	10.00	11.00	11.00	11.00	11.00
148	1.60	2.60	3.00	4.00	5.00	6.00	8.00	10.00	13.00
149	.....	.....	8.00	12.00	14.00	16.00	.....	.....	.....
151	7.00	8.00	10.00	14.00	16.00	20.00	24.00	27.00	31.00
152	6.40	10.00	14.00	18.00	22.00	26.00	38.00	48.00	64.00
153	6.00	10.00	12.00	14.00	24.00	30.00	48.00	64.00	130.00

REPAIR PARTS FOR YALE SPUR-GEARED BLOCKS



MODEL SS—FIG. 1377

BLOCKS 3 TONS AND LARGER

No.	Name of Part
341	Top Hook
342	Top Yoke
143	Top Guard & Guides
144	Top Sheave Pin
145	Top Sheaves

No.	Name of Part
147	Bottom Sheave
148	Bottom Sheave Pin
149	Becket Straps
151	Bottom Guards & Guides
152	Bottom Side Plates & Cross Head.
153	Bottom Hook

In ordering parts state whether for 1898 Model or Model SS. Parts Nos. 104 to 223 are the same in both Models. Parts Nos. 303 to 332 differ in 1898 Model and Model SS.

No.	Name of Part
104	Top Cross Head
113	Top Hook and Nut
119	Gear & Pinion Pins
125	Check Washer
127	Gear & Pinions
131	Lower Swivel Hook
200	Pawl Stud
201	Ratchet Disc
202	Leather Disc
203	Galv. Iron Disc
210	Pawl Spring
214	Strap Hand Chain Guide
216	Disc Hub
221	Pinion Cage
223	Pawl
303	Small Separator
305	Load Chain Guide
308	Load Chain Guide Bolt
312	Large Separator
318	Driving Pinion
320	Ratchet Case
324	Stripper
326	Internal Gear
328	Hand Wheel
329	Load Sheave
330	Gear Cover
332	Suspension Plate
	Load Chain Steel
	Hand Chain Steel

PRICES OF REPAIR PARTS FOR SPUR-GEARED BLOCKS—MODEL SS

List No.	1000	2000	3000	4000	6000	8000 to 40000
104	\$2.00	\$2.80	\$4.00	\$4.80	.....	.....
113	2.00	2.80	3.60	4.00	.....	.....
119	.80	1.20	1.40	1.60	\$1.40	\$1.60
125	.80	1.00	1.40	1.80	1.40	1.80
127	1.60	2.20	2.80	3.20	2.80	3.20
131	3.00	4.60	6.40	11.00	.....	.....
200	.80	.80	1.00	1.00	1.00	1.00
201	1.60	2.00	2.80	3.00	2.80	3.00
202	.80	.80	1.00	1.20	1.00	1.20
203	.80	.80	1.00	1.20	1.00	1.20
210	.40	.40	.60	.60	.60	.60
214	1.50	2.40	3.00	3.60	3.00	3.60
216	3.60	4.60	6.40	8.40	6.40	8.40
221	3.20	4.20	6.40	8.40	6.40	8.40
223	.40	.40	.60	.60	.60	.60
303	.80	1.00	1.20	1.40	1.20	1.40
305	.60	.60	.80	1.00	.80	1.00
308	.40	.40	.60	.80	.60	.80
312	1.20	1.40	1.60	2.00	1.60	2.00
318	6.00	8.00	10.00	12.00	10.00	12.00
320	5.00	7.00	9.00	11.00	9.00	11.00
324	.60	.80	1.00	1.00	1.00	1.00
326	4.80	6.40	10.00	12.00	10.00	12.00
328	3.60	4.60	6.00	7.20	6.00	7.20
329	4.00	6.40	9.50	12.70	9.50	12.70
330	2.40	3.00	3.60	4.20	3.60	4.20
332	3.00	4.00	5.00	6.00	5.00	6.00
Load Chain	.80*	.90*	1.00*	1.10*	1.00*	1.10*
Hand Chain	.50	.50	.50	.50	.50	.50

*In ordering Load Chains, specify whether or not Hook is required. Parts should be specified "Quick Speed" for blocks marked on the gear cover. Always give size of Block. Parts 329 and 221 are a driven fit. In assembling see that the locating holes in No. 127 line up at the center.

FOR PRICES OF REPAIR PARTS FOR SPUR-GEARED BLOCKS—3 TONS AND LARGER—SEE PAGE 387

DAKE CHAIN AND WIRE ROPE HOISTS

FOR STEAM OR COMPRESSED AIR

The economic uses of efficient, convenient and dependable hoists for lifting and handling materials, and for transferring work in process from one operation to the next is today a factor of utmost importance in every field of industrial activity. The recognized superiority of the Dake hoists from practically every standpoint has led to their adoption in many of our largest manufacturing plants where efficiency methods of the highest degree are carefully planned, under the most expert supervision, and where every unit or piece of equipment is carefully selected or chosen strictly on merit and labor saving qualities.

"CH" STYLE, HOOK
TYPE HOIST WITH
CHAIN SHEAVES AND
CHAIN

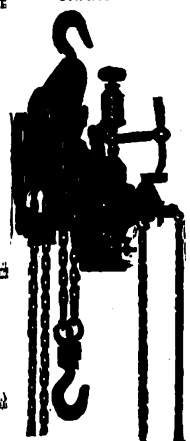


FIG. 1378

"CH" STYLE, HOOK
TYPE HOIST WITH
WIRE ROPE AND
DRUMS

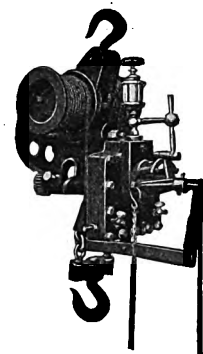


FIG. 1379

THE MOTOR

The motor used on these hoists is the standard reversing type Dake square piston motor with the throttle placed on the front cover. The motor is entirely self-contained, practically noiseless and without vibration—a most essential feature for hoist duty and provides steady, careful and precise control of the load without jerk or jar. The lubricator on the motor is the automatic suction feed type and operates only while the hoist is used.

WORM AND SPUR GEARING

The Dake is a safe, powerful and easy working hoist and has two gear reductions between the motor and the cable drums or chain sheaves. An accurately cut spur gear and pinion connects between the motor shaft and a worm and worm wheel of high-speed type which is enclosed in an oil tight case and runs in an oil bath. This insures smooth action, thorough lubrication and minimum wear. The worm is cut from high carbon steel and meshes into a bronze worm wheel. The worm bearings are bronze and the worm has ball or roller bearings at one end to take up the end thrust when the load is being raised.

HOOK AND TROLLEY TYPE

Dake hoists are furnished in the Hook type with the hoist supported from a forged steel hook; or the mono-rail Trolley Type for operating on the lower flanges of a single I-beam; also double rail Trolley Type for operating on two I-beams.

SAFETY HANGERS

On each type the hoist is suspended from the hook or the trolley by two steel hangers, which fit around the hub on each side of the gear case. These hangers have no bearing on the shaft to cut or cause wear. The bolts which fasten the cap of the gear case have nothing to do with sustaining the weight of the hoist, so that there is no danger of the hoist dropping, nor any damage caused by the bolts working loose. The trolleys are made of cast steel with chilled cast iron wheels that are fitted with anti-friction roller bearings. Dake hoists are built with ample strength in all parts to sustain a load of double their rated capacities.

THE CABLE

The wire cable used on the Wire Rope Hoists is of best flexible quality and the drums are machine grooved so that there is no slipping or excessive wear. The drums are also furnished of sufficient length to accommodate the cable for the specified heights in lifts with a single winding.

THE CHAIN

The chain used on the Chain Hoists is highest quality guaranteed pocket wheel chain made especially for, and carefully tested for the sheaves.

Style	Capacity, Tons	Standard Height of Lift, Feet	Distance Between Hooks, Inches	Shipping Weight Pounds	Extra in Foot Lift	Foot Speed Per Minute	Hook Type	
							List Price With Chain	List Price With Wire Rope
0 CH	1/2	8	24	210	on app.	24	on application	on application
1 CH	1	10	30	225	" "	16	" "	" "
1 1/2 CH	2	10	30	410	" "	14	" "	" "
2 CH	3	10	36	450	" "	10	" "	" "
3 CH	5	10	40	685	" "	7	" "	" "
3 1/2 CH	7	10	56	900	" "	8	" "	" "
4 CH	10	10	..	1100	" "	8	" "	" "

DAKE TROLLEY HOIST WITH HAND RACKING DEVICE

FOR STEAM OR COMPRESSED AIR

This hoist is the same as the regular "CH" type trolley hoist, but is equipped with a hand racking device on the trolley consisting of gears, sprocket wheel and endless chain. It is designed for use where heavy loads are to be transferred short distances, and also where the load is to be spotted with care and precision as in machine shops, foundries, etc.

These hoists are furnished with either wire rope and drums, or with chain wheels and chain as listed.

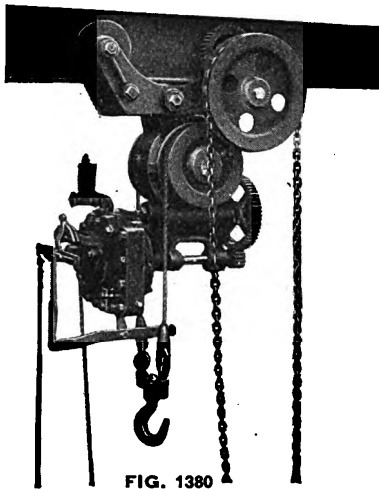


FIG. 1380

"HR" STYLE, TROLLEY TYPE HOIST, WITH WIRE ROPE AND DRUMS

Size No.—Style	Capacity, Tons	Standard Height of Lift, Feet	Shortest Distance from Center of Hook to Bottom of Beam Inches	Shipping Weight Pounds	Extra in Foot Lift	Foot Speed Per Minute	Price Chain Type	Price Wire Rope Type
1 HR	1	10	20	390	on app.	16	on application	"
1½ HR	2	10	26	390	" "	14	" "	"
2 HR	3	10	28	485	" "	10	" "	"
3 HR	5	10	30	750	" "	7	" "	"
3½ HR	7	10	36	975	" "	8	" "	"
4 HR	10	10	..	1250	" "	8	" "	"

Can also be supplied with racking motor. Can be arranged for compressed air or electric current. Wire rope or chain used for hoisting. Send for special catalogue.

HARRINGTON I-BEAM TRAVELERS

TO RUN ON THE LOWER FLANGE

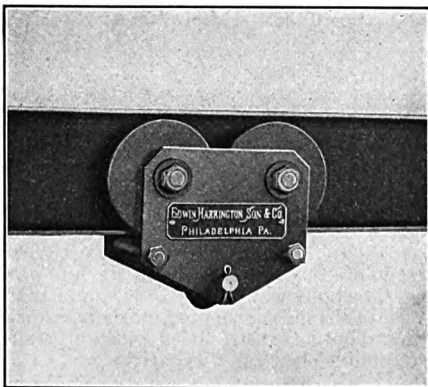


FIG. 1381—PLAIN

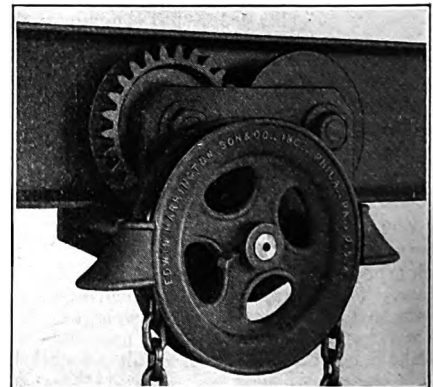


FIG. 1382—GEARED

The steel side plates give a maximum strength and at the same time allow light weight, saving of space and flexibility. The diameter of the wheels is made as large as the size of the beams used in general practice will allow. They are equipped with steel bushings and roller bearings, and the Geared Travelers are driven on both sides of the beam to prevent friction against the flanges.

Both Plain and Geared Travelers can be widened to suit beams larger than standard but will be sent regular unless otherwise ordered.

Capacity, in pounds	Standard Size of I-Beam in inches	Price of Travelers		Height of bottom of Beam from floor for Reg. Hand Chain	Price of Extra Hand Chain, per foot height	Weights of Plain Travelers (Standard)		Weights of Geared Travelers (Standard)		Size of Box (Standard) in inches		Pull or Hand Chain to move full load, in pounds
		Plain	Geared			Net	Gross (Boxed)	Net	Gross (Boxed)	Plain	Geared	
1000	5	\$ 28.00	\$ 52.00	9' 4"	\$1.00	38	52	62	83	12½x10½x11	16½x13 x11½	15
2000	6	32.00	56.00	9' 6"	1.00	45	59	71	92	13½x10½x11	15½x12½x12½	20
3000	7	38.00	62.00	9' 9"	1.00	71	94	96	124	15½x12½x12½	19 x14½x13	35
4000	8	44.00	70.00	11' 0"	1.00	75	98	106	134	19 x13 x13½	20 x14½x14	55
6000	9	54.00	84.00	12' 3"	1.00	112	143	145	180	20½x13½x16	21 x16½x16½	65
8000	10	66.00	104.00	12' 8"	1.00	116	147	150	186	21½x13½x16½	22 x17 x16½	75
10000	12	86.00	130.00	15' 0"	1.00	167	208	211	260	23 x14½x18½	24 x19 x18	80
12000	15	110.00	160.00	15' 2"	1.00	211	252	261	311	26½x15½x20	27 x19½x20	70
16000	20	140.00	190.00	15' 8"	1.00	360	432	412	492	33 x17½x26	33 x21 x26	70
20000	24	170.00	230.00	15' 10"	1.00	360	432	422	502	33 x17½x26	33 x21 x26	80
30000	24	200.00	300.00	17' 2"	1.00	640	725	690	775	34 x23 x29	34 x23 x29	120
40000	24	230.00	380.00	17' 9"	1.00	700	785	745	830	34 x23 x29	34 x23 x29	160

CONKEY PLAIN AND GEARED SINGLE I-BEAM TROLLEYS

FURNISHED WITH HYATT ROLLER BEARINGS, SOLID ROLLER BEARINGS OR PLAIN BEARINGS

PLAIN

Conkey Trolleys are equipped with unusually large wheels with crowned machined face, set at right angle to the track. Extra heavy steel side plates are used and the trolleys are easily adjustable to various sizes of I-Beams. Fig. 4086½ cross-section of trolley showing Hyatt Roller Bearings. We recommend that Hyatt equipped Conkey Trolleys be used. The small difference in price is more than offset by the superior service and satisfaction.

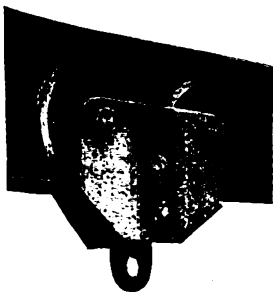


FIG. 4086

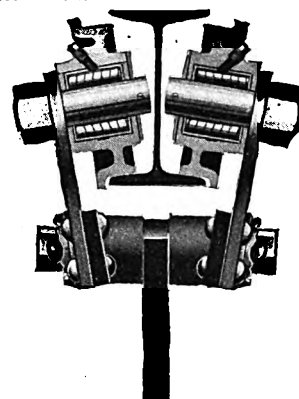


FIG. 4086½

Capacity in Tons	Standard Size Light I-Beams to which Trolleys are adjustable, Inches	Diameter of tread of wheels, Inches	Approximate Weight, pounds	Price Trolley Equipped with Hyatt Roller Bearings	Price Trolley Equipped with Solid Roller Bearings	Price Trolley Equipped with Plain Bearings
½	4, 5, 6 and 7	3¼	25	\$16.00	\$15.00	\$10.00
1	5, 6, 7 and 8	4¼	40	22.00	21.00	16.00
2	6, 7, 8 and 9	5¼	65	30.00	28.00	23.00
3	8, 9, 10 and 12	7¼	120	40.00	38.00	33.00
4	10, 12 and 15	9⅞	180	50.00	48.00	43.00
5	12, 15 and 18	11	240	65.00	62.00	58.00
6	15, 18 and 20	11	300	75.00	70.00	65.00
8	18, 20 and 24	11¾	400	95.00	90.00	75.00
10	20 and 24	12¾	525	110.00	105.00	90.00

GEARED

For the movement of heavy loads where accurate spotting is required we recommend geared trolleys.



FIG. 4087

Capacity in Tons	Standard Size Light I-Beams to which Trolleys are adjustable, Inches	Diameter of tread of wheels, Inches	Approximate Weight, Lbs.	Price Trolley Equipped with Hyatt Roller Bearings	Price Trolley Equipped with Solid Roller Bearings	Price Trolley Equipped with Plain Bearings
3	8, 9, 10 and 12	7¼	150	\$60.00	\$58.00	\$53.00
4	10, 12 and 15	9⅞	225	75.00	73.00	65.00
5	12, 15 and 18	11	300	90.00	87.00	80.00
6	15, 18 and 20	11	350	100.00	95.00	85.00
8	18, 20 and 24	11¾	450	110.00	100.00	95.00
10	20 and 24	12¾	575	130.00	120.00	115.00

SINGLE I-BEAM HAND-TRAVELING CRANES

These cranes are all geared to rack from the ground by means of hand chains and are equipped with plain or geared trolleys traveling on lower flange of bridge member. All cranes, where bridge member is smaller than 10 inch I-Beam, are furnished with trucks made of structural steel. On bridge members of a larger size cast steel truck ends are used. The construction of these cranes permits them to be used in very limited headroom. The construction is simple, and the crane is easily and quickly erected, even in close quarters. All cranes constructed with safety factor of at least five. When ordering, give maximum weight of load, distance center to center of runway rails (which should preferably be 30 pound standard T-Rails, fastened on top of I-Beam or timber track), distance from center of runway rails to outer rails, height from crane runway track to floor. Blue print showing construction and clearances will be furnished on application. Price upon application.

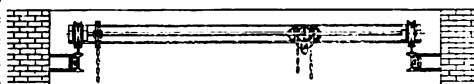


FIG. 4088

SWINGING BRACKET JIB CRANE

These cranes can be erected on any wall or post and are never in the way of any work on the floor. The swing of the jib covers a large area and also can be worked in connection with overhead traveling cranes, transferring the loads from one crane to another in an adjoining bay. The construction is very simple and the crane can be erected by any workman. The tie rod connections are made to allow a moderate variation. The hinge plates will be drilled for bolting on wall without extra charge if drawing is furnished showing location of holes, otherwise plates will be left for purchaser to drill holes as required. Price upon application.

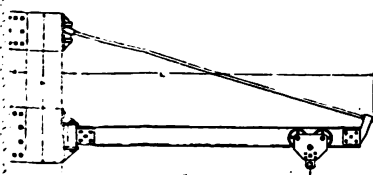


FIG. 4089

LEADVILLE DRILL COLUMN HOISTS

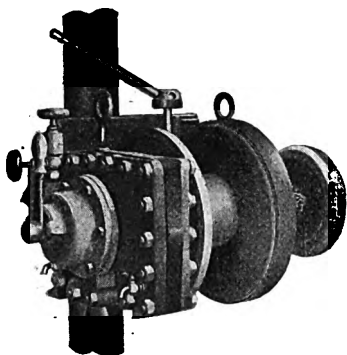


FIG. 1383
LEADVILLE
CAPACITY 700 LBS.—80 F. P. M.

Drum, 5 inches diameter by 5-inch face.
Drum holds 500 feet of $\frac{1}{4}$ -inch steel rope.
Rope speed, 80 feet per minute.
Load capacity, 700 pounds.
Engine, $2\frac{1}{2}$ horse-power.

A simple and powerful compressed air hoist to be mounted on a drill column for winch and stope work.

Note the absence of rods, levers, exposed gears, etc., as compared to other similar devices. The weight is evenly balanced. There are no overhanging parts to be damaged in handling. The gears are provided with gear guards.

The engine is enclosed and reversible by a slight movement of the throttle. It is of the square piston type and contains but three moving parts, two pistons and the crank pin. The covers are fitted with ground joints, no gaskets being used. There are no stuffing boxes or glands.

The drum is mounted concentric with the engine shaft and revolves in heavy brass bushings. Convenient spring covered oil openings are provided for lubrication. The drum can be instantly released for lowering by sliding the driving pinion out of mesh, although in many cases operators prefer to lower by reversing the engine.

The main gear is cut steel, bolted to the drum. Both pinions are steel forgings with cut teeth. A powerful contracting band brake, lined with brake band lining, bears directly on the drum flange.

Bolt holes are provided for attaching hoist to timbers instead of column where possible.

SPECIFICATIONS

Air pressure, 70 to 100 pounds.
Air connection tapped, $\frac{3}{4}$ -inch.
Air consumption about 50 cubic feet per minute.
Oil capacity of lubricator, $\frac{1}{4}$ pint.
Weight, net, 200 pounds; boxed, 250 pounds.

FITTINGS

Include clamp for attaching to column, but not the column. Two eye-bolts for handling, also throttle valve and the proper fittings for lubrication.

This hoist can be fitted to run with steam on special order.

Prices on application.

SUPER-LEADVILLE DRILL COLUMN HOISTS

The Super-Leadville hoist has been brought out to meet heavier service. It is designed for loads up to 1,200 pounds, and handles them with the same ease and safety that the Regular Leadville Hoist raises loads of 700 pounds.

In general, the appearance and construction of this hoist is similar to the regular Leadville hoist, but the increase in size has enabled us to change some details required by the increased duty.

It is the most powerful column hoist on the market, and without question the best built and most economical in air consumption.

The engine is double acting and instantly reversible. The pistons are counter-weighted. The fly wheel is enclosed. The sides of the drum are both flanged for strength, the brake running on the left flange.

The brake is a powerful double-acting steel band $13\frac{1}{2}$ inches in diameter by $1\frac{1}{2}$ -inch face, lined with brake band lining. The brake lever can be changed to suit the operator. The adjustment on the brake band is simple and positive.

Bolt holes are provided for attaching hoist to timbers instead of column where possible.

The main gear is a forged steel ring pressed into the inside of the drum flange and pinned. The teeth of this gear are cut on a special machine. The intermediate gear is cut from a forged steel blank, and held in place with a Woodruff key. The intermediate pinion and pinion shaft are all in one piece, namely, forged integral from chrome vanadium steel stock. The shaft is highly finished and runs in phosphor bronze bearings, provided with spring covered oil holes.

All gears are housed in the gear box and, therefore, no exposed parts to endanger the operator or collect dirt. The drum is thrown into engagement by shifting the sliding pinion, for which purpose a knurled wheel will be observed on the right side of the hoist.

All hoists are run under full load and carefully tested before shipment.

SPECIFICATIONS

Drum, 6 inches diameter by 7-inch face.
Drum holds:
1,080 feet $\frac{1}{4}$ -inch rope; 680 feet $\frac{5}{16}$ -inch rope.
565 feet $\frac{3}{8}$ -inch rope.
Rope speed, 100 feet per minute.
Load capacity, 1,200 pounds.
Engine, $4\frac{1}{2}$ horse-power.

Air pressure, 80 to 100 pounds.
Air connection tapped, 1 inch.
Air consumption about 75 cubic feet per minute.
Oil capacity of lubricator, 3 pints.
Column recommended, $4\frac{1}{2}$ inches.
Weight, net, 360 pounds; boxed, 420 pounds.

FITTINGS

Include clamp for attaching to column, but not the column. Two eye-bolts for handling, also throttle valve and the proper fittings for lubrication.

This hoist can be fitted to run with steam on special order.

Prices on application.

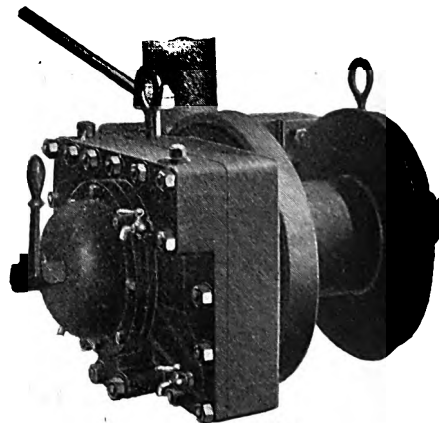


FIG. 1384
SUPER LEADVILLE
CAPACITY 1200 LBS.—100 F. P. M.

DAKE AIR OR STEAM MOTORS

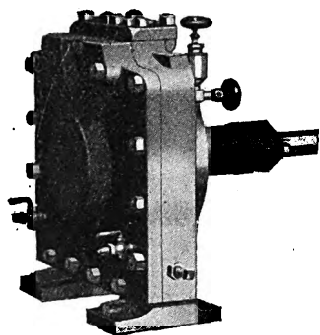


FIG. 1386

DAKE NON-REVERSING MOTOR

NON-REVERSING TYPE

The Dake Air or Steam Motor—non-reversing type for use with any style of installation where back-up or reverse motion is not required. Furnished for either right or left hand rotation as ordered. Its adaptability for applying or attaching to most any machines or appliances will be readily appreciated. It is compact, easy to install and easy to operate.

These engines are furnished with the shaft revolving to the right, clock-wise as you stand facing the front cover, unless otherwise specified. Special shaft extension can be furnished if required.

REVERSING TYPE

The Dake Reversing Air or Steam Motor—"The engine that starts, stops or reverses instantly." You manipulate the throttle lever and the engine does the rest—responding instantly to the operator's will. A compact, powerful, convenient engine—simple to operate, easy to install and adaptable for most any service. Special shaft extension can be furnished when required.

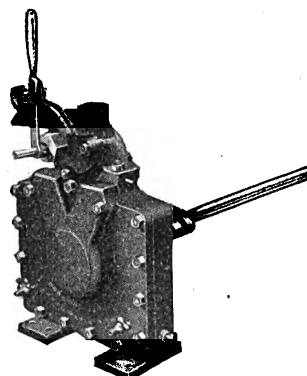


FIG. 1387

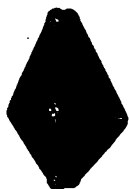
DAKE REVERSING MOTOR

Dake Motor Specifications							Non-Reversing Type	Reversing Type
Size No.	Rated Horse Power at 90 lb. Pressure	Speed	Size of Air Pipe Inches	Size of Exhaust Pipe, Inches	Diameter of Shaft, Inches	Standard Length of Shaft, inches	Shipping Weight, Pounds	Shipping Weight, Pounds
00	$\frac{1}{2}$	1000	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{3}{4}$	10	75	90
0	$\frac{3}{4}$	900	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{7}{8}$	12	95	100
1	2	800	$\frac{1}{2}$	$\frac{3}{4}$	$1\frac{1}{8}$	12	120	140
2	3	700	$\frac{1}{2}$	1	$1\frac{1}{4}$	18	170	200
3	5	600	1	$1\frac{1}{4}$	$1\frac{1}{2}$	18	225	265
$3\frac{1}{2}$	7	500	1	$1\frac{1}{4}$	$1\frac{5}{8}$	22	325	380
4	10	400	$1\frac{1}{4}$	$1\frac{1}{2}$	$1\frac{3}{4}$	27	550	560
5	15	350	$1\frac{1}{2}$	2	$2\frac{3}{8}$	27	800	925
6	20	300	2	$2\frac{1}{2}$	$2\frac{5}{8}$	28	1350	1450
7	30	250	$2\frac{1}{2}$	3	$2\frac{7}{8}$	30	1850	2000

Extra charge is made for furnishing shafts of special length or diameter. Prices on application.

AMERICAN HEAVY WIRE ROPE BLOCKS

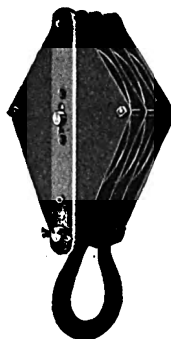
SELF LUBRICATING BUSHINGS



NO. 219—FIG. 1388



NO. 811—FIG. 1390



NO. 560—FIG. 1389



NO. 812—FIG. 1391



NO. 813—FIG. 1392

WITHOUT HOOK

NOS. 219 & 811

In derrick work one hook on the fall line block is usually necessary, the other block not requiring a hook. The grooves in these sheaves are perfectly even and smooth, and do not cut the ropes. The axle and pins are extra large.

A strong point in these blocks is the fact that any of the hooks, either swivel or plain are interchangeable, one with another, and between single and double blocks. A hook of either kind can be bought subsequent to the purchase of a block without a hook, and it will fit in place.



NO. 217—FIG. 1393



NO. 218—FIG. 1394

WITH PLAIN HOOK

NOS. 217 & 812

Pins and axles are of steel, extra large size. Hooks are of a special make of mild steel as tough as Norway iron, but not so easily straightened out, and as strong, but not so brittle, as common steel.

The side plates of steel, entirely covering the sheave, are a complete protection from chipping or breaking.

WITH SWIVEL HOOK

NOS. 218 & 813

The swivel hook is a great advantage; the load can be swung without twisting the ropes. It is interchangeable with single and double blocks. (Here is a point worth noting.) Being supported by only one heavy pin, the hook can swing, a decided advantage over a rigid fastening.

WITH SHACKLE

NO. 560

Extra large axles and pins. Plates of steel; full size diamond plates between sheaves, reinforced on outside by extra heavy straps. Shackle is made of mild steel as tough as Norway iron, but not so easily straightened out, and as strong, but not so brittle, as common steel.

SIZES AND PRICES

Outside Diam. of Sheaves Inches	Diameter Rope Inches	WITHOUT HOOK		WITH PLAIN HOOK		WITH SWIVEL HOOK		WITH SHACKLE	
		No. 219 Single	No. 811 Double	No. 217 Single	No. 812 Double	No. 218 Single	No. 813 Double	No. 560	
								Triple	Quadruple
11	$\frac{3}{8}$ or $\frac{1}{2}$	.....	.....	.....	.....	.....	.....	.....	.....
14	$\frac{5}{8}$ or $\frac{3}{4}$	.....	.....	.....	.....	.....	.....	.....	.....
16	$\frac{3}{4}$	.....	.....	.....	.....	.....	.....	.....	.....
18	$\frac{7}{8}$	.....	.....	.....	.....	.....	.....	.....	.....
20	1	.....	.....	.....	.....	.....	.....	.....	.....

AMERICAN HOOKS AND SHACKLES FOR WIRE ROPE BLOCKS



NO. 706—FIG. 1402



NO. 770—FIG. 1403



NO. 707—FIG. 1404



NO. 705—FIG. 1405

These hooks and shackles contain 30 per cent more material than any other hooks or shackles on the market.

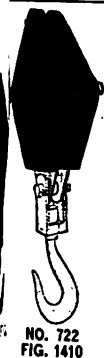
Size, Inches.....	2	2½	3	3½	4	4½
Plain Hook, No. 706.....
Plain Hook with Hanger No. 770.....
Swivel Hook No. 707.....
Shackle No. 705.....

AMERICAN CHEEK WEIGHTS FOR WIRE ROPE BLOCKS

These can be furnished for American Blocks already in use.

Size, Inches.....	11	14	16	18	20
Light Cheeks, price each.....
Heavy Cheeks, price each.....

11, 14 and 16-inch blocks can be supplied with 50 or 100-pound weights; 18-inch blocks can be supplied with 75 and 150-pound weights and 20-inch blocks can be supplied with 100 and 200-pound weights.

NO. 722
FIG. 1410

GALVANIZED THIMBLES FOR WIRE ROPE

For Rope diam. in.....	¼	⅜	½	⅝	¾	⅞	1	1⅛	1¼	1½
Price each.....

GUY OR CHAIN SHACKLE

Diam. of Iron, inches.....	⅝	¾	⅞	1	1⅛	1¼	1½
Price, each.....

CHAIN SAFETY HOOKS

FIG. 1406

Number.....	5	6	7
Size Hook, inch.....	1½	5/8	¾
For Cable, inch.....	5/8	¾	⅞
Price each.....	.....	.....	.....

MINING SAFETY HOOKS

FIG. 1408

For Rope diam. in.....	½	⅝	¾
Price, each.....



NO. 319—FIG. 1409



FIG. 1408



FIG. 1406

AMERICAN SNATCH BLOCKS

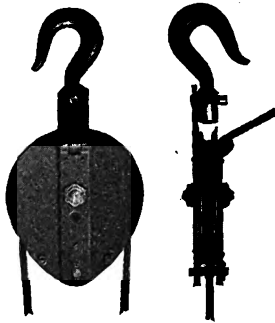
STEEL—FOR WIRE ROPE
SELF-LUBRICATING BUSHINGS

PLAIN HOOK NO. 429

The peculiar advantage of a Snatch Block is that the rope can be instantly removed without taking out the pins or loosening the rope.

SWIVEL HOOK NO. 795

This Block has an advantage over a Snatch Block with Plain Hook, in that the hook can be turned without twisting the rope.



NO. 795
FIG. 1395

Outside Dia. of Sheave, in.	Dia. of Rope inch		List Price Each	
	Plain	Swivel	Plain Hook	Swivel Hook
11	$\frac{3}{8}$ or $\frac{1}{2}$	$\frac{1}{2}$ or $\frac{5}{8}$	.....	.....
14	$\frac{5}{8}$ or $\frac{3}{4}$	$\frac{5}{8}$ or $\frac{3}{4}$	.....	.....
16	$\frac{3}{4}$	$\frac{5}{8}$ or $\frac{3}{4}$	.....	.....
18	$\frac{7}{8}$	$\frac{3}{4}$ or $\frac{7}{8}$	.....	.....
20	.....	1	.....	.....

NO. 429
FIG. 1396

STEEL SHELL SNATCH BLOCKS

DROP LINK OR BAIL

Open Hearth Steel Shell. Gray Iron Sheave with steel pin. Refined wrought iron straps, hook and link. Black japanned finish.

Length of Shell Inches	Size of Sheave Inches	Size of Rope Inches	PRICE, EACH		
			Iron Bushed and Self-Lubricating Iron Bushed	Improved Roller Bushed	Phosphor- bronze or Metaline bushed
6	3 x $1\frac{1}{8}$ x $\frac{1}{2}$	$\frac{7}{8}$	\$ 4.00	\$ 4.65	\$ 5.25
7	$3\frac{1}{2}$ x $1\frac{1}{4}$ x $\frac{1}{2}$	$\frac{7}{8}$	4.75	5.50	6.00
8	$4\frac{1}{2}$ x $1\frac{3}{8}$ x $\frac{5}{8}$	1	5.75	6.60	7.25
9	5 x $1\frac{3}{8}$ x $\frac{5}{8}$	$1\frac{1}{8}$	6.75	7.75	8.50
10	$5\frac{3}{4}$ x $1\frac{7}{8}$ x $\frac{3}{4}$	$1\frac{1}{4}$	8.50	10.00	11.00
12	$6\frac{3}{4}$ x $2\frac{1}{8}$ x $\frac{3}{4}$	$1\frac{1}{2}$	10.00	11.50	13.00
14	8 x $2\frac{1}{4}$ x $\frac{7}{8}$	$1\frac{3}{4}$	13.00	15.00	16.50
16	9 x $2\frac{5}{8}$ x 1	2	17.00	20.00	22.00
18	10 x 3 x $1\frac{1}{8}$	$2\frac{1}{4}$	25.00	28.50	31.00
20	11 x $3\frac{1}{2}$ x $1\frac{1}{4}$	$2\frac{1}{2}$	38.00	43.00	46.00
22	$11\frac{3}{4}$ x $4\frac{1}{4}$ x $1\frac{1}{2}$	3	55.00	63.00	68.00
24	$12\frac{1}{2}$ x $4\frac{1}{2}$ x $1\frac{1}{2}$	$3\frac{1}{2}$	70.00	78.00	86.00
26	14 x $4\frac{3}{4}$ x $1\frac{3}{4}$	4	90.00	.....	110.00



FIG. 1398

WOOD SHELL SNATCH BLOCKS

DROP LINK OR BAIL

Varnished Hardwood Shell, riveted together. Gray Iron Sheave. Wrought Iron Straps. Swivel Iron Hook. All iron parts Japanned finish.

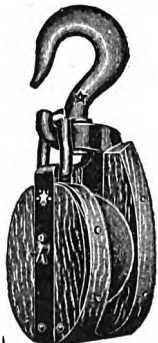


FIG. 1397

Length of Shell Inches	Size of Sheave Inches	Size of Rope Inches	PRICE, EACH		
			Iron Bushed and Self-Lubricating Iron Bushed	Improved Roller Bushed	Phosphor- bronze or Metaline bushed
6	3 x $1\frac{1}{8}$ x $\frac{1}{2}$	$\frac{7}{8}$	\$ 4.00	\$ 4.65	\$ 5.25
7	$3\frac{1}{2}$ x $1\frac{1}{4}$ x $\frac{1}{2}$	$\frac{7}{8}$	4.75	5.50	6.00
8	$4\frac{1}{2}$ x $1\frac{3}{8}$ x $\frac{5}{8}$	1	5.75	6.60	7.25
9	5 x $1\frac{3}{8}$ x $\frac{5}{8}$	$1\frac{1}{8}$	6.75	7.75	8.50
10	$5\frac{3}{4}$ x $1\frac{7}{8}$ x $\frac{3}{4}$	$1\frac{1}{4}$	8.50	10.00	11.00
12	$6\frac{3}{4}$ x $2\frac{1}{8}$ x $\frac{3}{4}$	$1\frac{1}{2}$	10.00	11.50	13.00
14	8 x $2\frac{1}{4}$ x $\frac{7}{8}$	$1\frac{3}{4}$	13.00	15.00	16.50
16	9 x $2\frac{5}{8}$ x 1	2	17.00	20.00	22.00
18	10 x 3 x $1\frac{1}{8}$	$2\frac{1}{4}$	25.00	28.50	31.00
20	11 x $3\frac{1}{2}$ x $1\frac{1}{4}$	$2\frac{1}{2}$	38.00	43.00	46.00
22	$11\frac{3}{4}$ x $4\frac{1}{4}$ x $1\frac{1}{2}$	3	55.00	63.00	68.00
24	$12\frac{1}{2}$ x $4\frac{1}{2}$ x $1\frac{1}{2}$	$3\frac{1}{2}$	70.00	78.00	86.00
26	14 x $4\frac{3}{4}$ x $1\frac{3}{4}$	4	90.00	.....	110.00

WOOD TACKLE BLOCKS

SINGLE
FIG. 1399DOUBLE
FIG. 1400TRIPLE
FIG. 1401

Varnished Hardwood Shell, riveted together. Inside Iron Strapped with Iron Sheaves, Loose Iron Hooks and Becket.

Dimensions, Inches			PRICE EACH								
			Iron Bushed			Roller Bushed			Phosphor Bronze		
Length Shell	For Rope	Sheaves	Single	Double	Triple	Single	Double	Triple	Single	Double	Triple
3	$\frac{3}{8}$	$1\frac{3}{4} \times 1\frac{1}{2} \times \frac{3}{8}$	\$0.70	\$1.30	\$1.75	\$1.10	\$2.00	\$2.90	....	....	....
$3\frac{1}{2}$	$\frac{3}{8}$	$2 \times 1\frac{1}{2} \times \frac{3}{8}$	.75	1.45	2.00	1.15	2.20	3.15	....	....	....
4	$\frac{1}{2}$	$2\frac{1}{4} \times 1\frac{5}{8} \times \frac{3}{8}$	.85	1.60	2.15	1.20	2.25	3.25	\$ 1.50	\$ 2.90	\$ 4.15
5	$\frac{5}{8}$	$3 \times 1\frac{3}{4} \times \frac{3}{8}$	.90	1.75	2.25	1.25	2.35	3.50	1.75	3.35	4.75
6	$\frac{3}{4}$	$3\frac{1}{2} \times 1\frac{1}{2} \times \frac{1}{2}$	1.10	2.00	2.90	1.50	2.85	4.40	2.20	4.00	5.80
7	$\frac{7}{8}$	$4\frac{1}{4} \times 1\frac{1}{2} \times \frac{1}{2}$	1.30	2.40	3.50	1.70	3.35	5.00	2.50	4.50	6.70
8	1	$4\frac{3}{4} \times 1\frac{1}{8} \times \frac{5}{8}$	1.65	2.85	4.25	2.25	4.15	6.00	3.25	5.70	8.50
9	1	$5\frac{1}{2} \times 1\frac{1}{8} \times \frac{5}{8}$	1.85	3.40	4.75	2.50	4.70	7.25	3.70	6.75	10.00
10	$1\frac{1}{8}$	$6\frac{1}{4} \times 1\frac{1}{4} \times \frac{5}{8}$	2.75	4.50	6.25	3.50	6.00	8.50	4.75	8.50	12.50
11	$1\frac{1}{8}$	$7\frac{1}{4} \times 1\frac{1}{4} \times \frac{3}{4}$	4.45	7.50	10.65	5.30	9.20	13.20	6.75	12.50	18.50
12	$1\frac{1}{4}$	$8 \times 1\frac{3}{8} \times \frac{3}{4}$	4.45	7.50	10.65	5.30	9.20	13.20	6.75	12.50	18.50
13	$1\frac{1}{4}$	$9 \times 1\frac{1}{2} \times \frac{3}{4}$	7.00	10.50	15.00	8.15	12.80	18.45	9.75	17.00	25.00
14	$1\frac{3}{8}$	$9\frac{1}{2} \times 1\frac{5}{8} \times \frac{7}{8}$	7.00	10.50	15.00	8.15	12.80	18.45	9.75	17.00	25.00
15	$1\frac{1}{2}$	$10 \times 1\frac{7}{8} \times \frac{7}{8}$	8.00	13.00	18.00	9.25	15.50	21.75	11.00	19.50	28.50
16	$1\frac{5}{8}$	$11 \times 1\frac{3}{4} \times \frac{7}{8}$	10.00	15.00	22.00	11.50	18.00	26.50	14.00	24.00	34.00

FOR BLOCKS WITH LOOSE SWIVEL HOOKS

ADD TO LIST FOR EACH HOOK

Size, Shell Inches.....	5	6	7	8	9	10	11	12	13	14	15	16
Single Blocks	\$0.50	\$0.50	\$0.50	\$0.60	\$0.75	\$0.90	\$1.20	\$1.20	\$2.50	\$2.50	\$3.00	\$ 3.50
Double Blocks	.50	.50	.60	.75	.90	1.20	1.75	1.75	3.00	3.00	3.50	6.00
Triple Blocks	.50	.60	.75	.90	1.20	1.75	2.50	2.50	3.50	3.50	4.50	8.00

STONE TONGS

FIGS. 1428 AND 1429

Furnished promptly any size or style desired. State opening wanted, capacity and style. Prices quoted upon request.

I-BEAM CLAMPS

FIG. 1430

Clamps of any design or size forged to order.

Size No.	Cap. Tons	Maximum Size Beam	Weight Pounds	Price Each
15	1	10	20	....
16	2	15	30	....
17	3	20	45	....



FIG. 1429

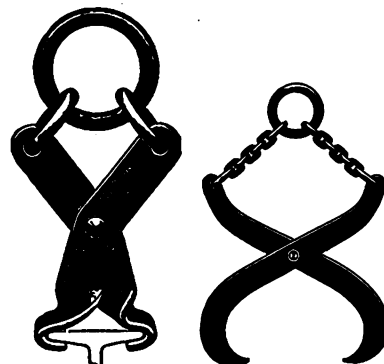


FIG. 1430

FIG. 1428

AMERICAN DERRICK GUY TIGHTENERS

SHORT PATTERN



FIG. 1423

LONG PATTERN

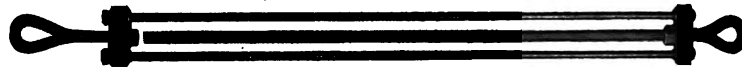


FIG. 1424

Diameter of Screw Inches	Length of Takeup Inches	List Price	Diameter of Screw Inches	Length of Takeup Feet	List Price
$\frac{3}{4}$	30	.....	1	4	.....
$\frac{7}{8}$	30	.....	$1\frac{1}{4}$	4	.....
1	30	.....	$1\frac{1}{2}$	4	.....
$1\frac{1}{4}$	30	.....	2	4	.....
$1\frac{1}{2}$	30	.....	$2\frac{1}{4}$	4	.....

AMERICAN DERRICK GUY TIGHTENER WITH SHEAVE



FIG. 1425

Diam. of Screw Inches	Length of Takeup, Feet	List Price
1	4	.....
$1\frac{1}{4}$	4	.....
$1\frac{1}{2}$	4	.....
2	4	.....

FORGED STEEL GRAB HOOKS AND CHAIN

Ordering No.	Nominal Cap'ty Tons	Distance "X" Inches	Size of Chain Inches	Length of Chain Feet	Price Com- plete
3337	$2\frac{1}{2}$	7	$\frac{1}{2}$	10	.....
3338	5	8	$\frac{5}{8}$	14	.....
3339	10	9	$\frac{3}{4}$	16	.....
3340	15	9	1	18	.....
3341	25	10	$1\frac{1}{4}$	20	.....

The nominal tons capacity cannot be given under all conditions, either in hooks or chain. A very wide stone with a short chain may exert strains many times in excess of the loads.

The chain is the finest grade of BBB Crane Chain, with short links.



FIG. 1426

SLING CHAINS

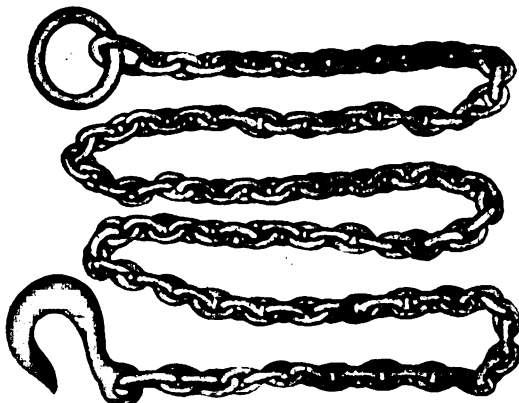


FIG. 1427

Made of common "B. B." or "B. B. B." chain.

We are in position to furnish chains of any capacity, and attach hooks or rings in the shortest possible time.

Please state length, quality and size of chain desired and style of hooks or rings wanted.

For capacity see table giving "proof tests."

CHAIN



COMMON OR PROOF COIL CHAIN

FIG. 1431

This grade is made of first-class iron, and welded by experienced workmen. It is a good, reliable chain for general use.

"BB" COIL CHAIN

This chain is made of extra quality material. It is welded, and dotted to make welds smooth.

PROOF-STRAIGHT SHORT LINK

Size, inch	$\frac{1}{8}$	$\frac{1}{4}$	$\frac{5}{16}$	$\frac{3}{8}$	$\frac{7}{16}$	$\frac{1}{2}$	$\frac{5}{8}$	$\frac{3}{4}$	$\frac{7}{8}$	1	$1\frac{1}{8}$	$1\frac{1}{4}$	
Approximate links to foot	13½	12½	11	10	9	8	7½	6½	6	5	4	3¾	3½
Weight per 100 feet, pounds	46	75	110	155	200	260	325	400	590	800	1000	1300	1500
Proof Test, pounds	1000	1500	2600	3600	4500	6500	8000	9500	13500	18500	24000	29000	39000
Approx. breaking strength, lbs.	2000	3300	5200	7200	10000	13000	16000	20000	28800	39000	51500	60000	80000
Black Per pound													
Galvanized Per pound													

(BB)—QUALITY

Size, inch.....	$\frac{1}{8}$	$\frac{1}{4}$	$\frac{5}{16}$	$\frac{3}{8}$	$\frac{7}{16}$	$\frac{1}{2}$	$\frac{5}{8}$	$\frac{3}{4}$	$\frac{7}{8}$	1	$1\frac{1}{8}$	$1\frac{1}{4}$
Approximate links to foot.....	14½	13½	12	11	9½	8½	8	7	6¼	5¼	4¼	3½
Weight per 100 feet, pounds.....	50	80	115	160	210	265	335	410	600	820	1030	1350
Proof Test, pounds.....	1100	1650	3000	4000	5500	7000	8800	10750	15500	21000	28500	36000
Approx. breaking strength, lbs.....	2200	3800	5600	8000	11500	15000	18500	23000	33500	44000	59000	74000
Per pound.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....

STRAIGHT LINK



FIG. 1432

Wrought steel, welded links, bright finish.

Number	0000	000	00	0	1
Diameter, inches.....	$\frac{1}{4}$	$\frac{5}{16}$	$\frac{11}{16}$	$\frac{1}{2}$	$\frac{11}{16}$
Breaking strain, lbs.....	1700	1600	1500	1300	1100
Weight 100 ft., lbs.....	36	32	27	23	19
Hundred ft.....	\$13.00	11.00	10.00	8.80	7.80

TWISTED LINK



FIG. 1433

Number	000	00	0
Diameter, inches.....	$\frac{5}{16}$	$\frac{11}{16}$	$\frac{1}{2}$
Breaking strain, lbs.....	1600	1500	1300
Weight 100 ft., lbs.....	32	28	23
Hundred ft.....	\$11.00	10.00	8.80

MACHINE



FIG. 1434

Number	6/0	5/0	4/0	3/0	2/0
Amer. Gauge No.....	9-32	1-4	7-32	5	6
Weight 100 feet.....	68	61	50	40	34
List 100 feet.....	\$27.00	24.00	21.00	20.00	19.00

PASSING LINK COIL



FIG. 1435

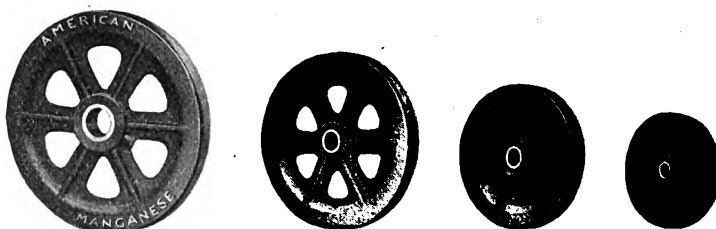
Short Wide Straight Link. Bright Steel.

Number	0000	000	00
Diameter of Wire, inches.....	$\frac{5}{16}$	$\frac{11}{16}$	$\frac{1}{2}$
Weight per hundred feet, lbs.....	50	45	35
Per hundred feet.....	\$15.00	13.50	12.75

One hundred feet in a package.

AMERICAN WIRE ROPE SHEAVES

SELF-LUBRICATING—16-INCH SHEAVES AND LARGER HAVE ARMS



NO. 664—FIG. 1411

The grooves are perfectly even and smooth and do not cut the rope. SELF-LUBRICATING sheaves cost more but they have the advantage of wearing longer, reducing wear on axle, and new bushings can be put into an old sheave.

Ordering Number	Outside Diameter Inches	Bushing Size, in.	Size of Rope Inches	Diameter at Bottom Groove Inches	Thickness Through Hub Inches	Price with Self-Lubricating Bushings
S 266	6	1 1/4 x 2	3/8 and 1/2	4 3/8	2	\$ 6.20
S 267	7	1 1/4 x 2	3/8 and 1/2	5	2	6.80
S 271	8	1 1/4 x 2	3/8 and 1/2	5 7/8	2	7.30
S 260	9	1 1/4 x 2	3/8 and 1/2	7	2	7.70
S 54	10	1 1/4 x 2	3/8 and 1/2	8	2	8.40
S 251	11	1 1/4 x 2	1/2 and 5/8	8 1/2	2	8.70
S 27	11	1 1/2 x 2	1/2 and 5/8	8 1/2	2	9.40
S 253	12	1 1/2 x 2	1/2 and 5/8	9 1/2	2	9.70
S 236	13 1/2	1 1/2 x 2	5/8 and 3/4	10 1/2	2	9.90
S 29	13 1/2	1 3/4 x 2	5/8 and 3/4	10 1/2	2	11.20
S 3	16	1 1/2 x 2	5/8 and 3/4	13	2	10.80
S 30	16	1 3/4 x 2	5/8 and 3/4	13	2	12.30
S 40	16	2 x 2	5/8 and 3/4	13	2	14.30
S 294	18	1 3/4 x 2 1/4	3/4 and 7/8	15	2 1/4	15.50
S 59	18	2 x 2	3/4 and 7/8	15	2	19.10
S 61	18	2 x 2 1/4	3/4 and 7/8	15	2 1/4	20.20
S 200	19	1 3/4 x 2	5/8 and 3/4	16	2	18.10
S 31	19	2 x 2	5/8 and 3/4	16	2	20.00
S 41	19	2 1/2 x 2	5/8 and 3/4	16	2	22.60
S 2	20	2 x 2	5/8 and 3/4	17	2	20.50
S 295	20	2 x 2 1/4	3/4 and 1	17	2 1/4	21.60
S 51	22	2 x 3	3/4 and 7/8	18 1/2	3	28.00
S 287	24	2 1/2 x 3	3/4 and 7/8	20 1/2	3	32.30
S 288	26	2 1/2 x 3	7/8 and 1	22	3	39.10
S 289	30	2 1/2 x 3	1 and 1 1/8	25 1/2	3	50.50
S 290	32	2 3/4 x 4	1 and 1 1/8	27 1/2	4	57.60
S 37	32	3 x 4	1 and 1 1/8	27 1/2	4	79.10
S 291	36	3 x 4	1 and 1 1/8	31 1/2	4	83.00
S 292	40	3 x 4	1 and 1 1/8	35 1/2	4	97.00

OVERHEAD SHEAVE WHEELS

Supplied not machined in the groove and with shaft and flat boxes unless otherwise ordered.

STANDARD LIGHT PATTERN

Pitch Dia. Inches.....	14	16	18	21	24	27	30	36	42	48	54	60	72
Dia. Shaft in sheave..	1 1/8	1 1/8	1 1/8	1 1/8	1 1/8	1 1/8	1 1/8	2 1/8	2 1/8	....	....	....	....
Total length of shaft....	11 1/4	11 1/4	11 1/4	13 3/4	13 3/4	13 3/4	13 3/4	19 1/2	19 1/2	....	....	....	....
Weight comp. pounds....	55	70	85	100	105	120	145	218	318	....	....	....	....
Price.....	....	....	....	....	....	....	....	....	....	....	....	....	....

HEAVY PATTERN

Dia. Shaft in sheave..	....	....	1 1/8	1 1/8	2 1/8	2 1/8	2 1/8	2 1/8	2 1/8	2 1/8	3 1/8	3 1/8	3 1/8
Total length of shaft....	....	....	13 3/4	13 3/4	19 1/2	19 1/2	23	23	24	24	28	28	31
Weight comp. pounds....	....	....	97	133	200	225	280	330	425	500	700	825	1275
Price.....	....	....	....	....	....	....	....	....	....	....	....	....	....

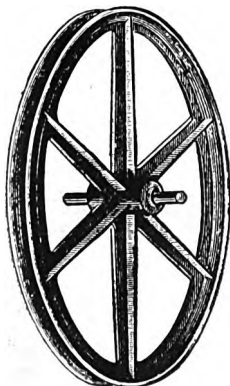


FIG. 1412

THE GENUINE "CROSBY" WIRE ROPE CLIPS

DROP FORGED STEEL—HEAVILY GALVANIZED. THE DEPENDABLE WIRE ROPE FASTENING



FIG. 1417

The Genuine "CROSBY" Clip is without question the most dependable Wire Rope clip on the market. In the first place, its design is such that maximum grip is brought to bear on the rope, yet this is done in such a way as not to injure the strands of the rope. In the next place this perfect gripping design is carried out in the very best material for the purpose; drop forged steel, and then armored against moisture with a heavy coat of galvanizing. The U-bolt is cold-bent from selected screw stock steel bars.

Three Genuine "CROSBY" Clips properly put on will hold any rope safely up to the capacity of the rope.

Safe wire rope clips are the best form of insurance for your equipment. You wouldn't buy liability insurance or any other kind of insurance just because it was cheap. In fact its very cheapness would make you suspicious of its reliability. That's the way you should buy wire rope clips. The Genuine "CROSBY" Drop Forged Steel Clip is the safest one you can buy. Use it always and insure yourself safe wire rope fastenings.



FIG. 1418

THE SAFE REINFORCING BAR SPLICE

Careful designing engineers specializing on circular reservoirs, water towers, coal bins, etc., of reinforced concrete, are becoming more and more reluctant to depend on long bar laps to produce enough "bond between concrete and steel" to make the splices safe. They realize that while theoretically correct if all conditions are right, it is practically impossible to be sure that all conditions will be right; so after numerous experiments and tests the Genuine "CROSBY" clip was found to give a safe splice; one, moreover that could be placed on a testing machine and its safe holding power proved.

The use of the Genuine "CROSBY" Clip made "continuous reinforcing" possible. That is, all the bars composing a circuit around a reservoir could be knit into a continuous hoop of steel. Thus the engineer could be sure of his reinforcing. That is why so many now always specify that their reinforcing bars are to be spliced with Genuine "CROSBY" Clips.

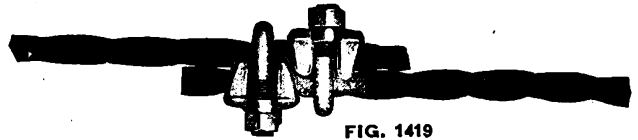


FIG. 1419

PRICES "CROSBY" DROP-FORGED WIRE ROPE CLIPS

Diameter of Rope inch	List Price	Diameter of Rope Inches	List Price
1/4	\$0.35	1 1/8	\$0.95
5/16	.35	1 1/4	1.10
3/8	.40	1 3/8	1.25
7/8	.45	1 1/2	1.50
1	.45	1 5/8	3.50
5/8	.55	1 3/4	5.50
3/4	.65	2	7.50
7/8	.75	2 1/4	9.50
1	.85	2 1/2	11.50

EXTRA HEAVY WIRE ROPE CLAMPS

WITH THREE BOLTS



FIG. 1420

Diam. of Rope in Inches	Circumf. of Rope in Ins.	Price Each	Diam. of Rope Inches	Circumf. of Rope in Ins.	Price Each
2 3/4	8 5/8	\$22.00	1	3	\$3.35
2 1/2	7 7/8	20.00	1 1/8	2 3/4	1.75
2 1/4	7 1/8	18.30	3/4	2 1/4	1.40
2	6 3/4	11.40	5/8 & 1 1/8	2 & 2 1/8	1.20
1 5/8 & 1 3/4	5 & 5 1/2	7.40	1/2 & 1 1/4	1 1/2 & 1 3/4	.80
1 3/8 & 1 1/2	4 1/4 & 4 3/4	5.10	3/8 & 1 1/8	1 1/8 & 1 1/4	.60
1 1/4	4	3.40	1/4 & 1 1/8	3/4 & 1	.40
1 1/8	3 1/2	2.50	.....	.....	.....

Furnished in black, japanned. If galvanized, special price.

TURNBUCKLES

STANDARD

Na. stub ends, in.	3/8	1/2	5/8	3/4	7/8	1	1 1/8	1 1/4	1 1/2	1 3/4	2
Length over all.	22	22	22	23	23	25	25	26	27	27	30
Weight each, lbs.	1/8	2	2 1/4	4	5 1/8	7	8 1/4	12	14	18	30
Each.	\$0.40	.45	.50	.63	.75	.88	1.00	1.25	1.38	1.50	2.65

HOOK AND EYE

Forged steel right and left hand threads

Na. thread, in.	3/8	1/2	5/8	3/4	7/8	1	1 1/8
Length in clear between heads, in.	3 1/2	4	4 1/4	4 1/2	5	6	7 1/2
Length of buckle outside, in.	4 1/8	4 3/4	5 1/4	5 3/4	6 1/4	7 1/2	8 1/2
Weight each, lbs.	3/4	1	1 1/8	1 1/4	1 1/2	1 3/4	2 1/4
Galvanized, each.	\$0.80	.85	.90	1.10	1.25	1.50	2.00



FIG. 1421 STANDARD



FIG. 1422 HOOK AND EYE

GALVANIZED IRON FOR SHIPS RIGGING AND DERRICK GUYS

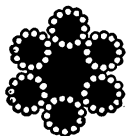


**FIG. 1413
COMPOSED OF 6 STRANDS, HEMP CENTER, 7 TO 12 WIRES
TO THE STRAND**

Diameter, Inch	Per Foot		Circumference Inch	Weight Per Foot, Lbs.	Breaking Strain in Tons of 2,000 Lbs.	Circumference in Inches of New Manila Rope of Equal Strength
	With 7 Wires to the Strand	With 12 Wires to the Strand				
1/4	\$0.44	\$0.46	5 1/2	4.85	42.	11
1/2	.41	.43	5 1/4	4.42	38.	10 1/2
3/4	.38	.40	5	4.15	35.	10
7/8	.35	.37	4 3/4	3.55	30.	9 1/2
1	.31 1/2	.33 1/2	4 1/2	3.25	28.	9
1 1/8	.28 1/2	.30 1/2	4 1/4	3.	26.	8 1/2
1 1/4	.25	.26 1/2	4	2.45	23.	8
1 1/2	.22 1/2	.24	3 3/4	2.2	19.	7 1/2
1 3/4	.19 1/2	.21	3 1/2	1.95	18.	6 1/2
1 7/8	.17 1/2	.18 1/2	3 1/4	1.77	16.1	6
2	.15	.16	3	1.58	14.1	5 3/4
2 1/8	.13		2 3/4	1.20	11.1	5 1/4
2 1/4	.11		2 1/2	1.03	9.4	5
2 1/2	.09		2 1/4	.89	7.8	4 3/4
2 3/4	.08		2	.62	5.7	4 1/2
2 7/8	.07		1 3/4	.49	4.46	3 3/4
3	.06		1 1/2	.39	3.39	3
3 1/8	.05		1 1/4	.3	2.35	2 1/2
3 1/4	.04 1/2		1 1/8	.22	1.95	2 1/4
3 1/2	.03 1/2		1	.16	1.42	2
5 Strands 7 Wires Each						
1/4	\$0.03		7/8	.123	1.20	1 3/4
1/2	.02 1/2		3/4	.09	.99	1 1/2
3/4	.02 1/4		5/8	.063	.79	1 1/4
1	.02		1/2	.04	.61	1 1/8

NOTE:—When made with wire center, add 10 per cent price per foot.

GALVANIZED STEEL HAWSER



**FIG. 1414
COMPOSED OF 6 STRANDS, HEMP CENTER, EACH STRAND CON-
SISTING OF 12 WIRES AND A HEMP CORE**

Diameter Inch	Per Foot	Circum- ference, Inch	Weight Per Foot, Lbs.	Breaking Strain in Tons of 2,000 Lbs.	Circumference in Inches of New Manila Hawser of Equal Strength
1/4	\$0.57	5 1/2	3.23	61.	13 1/2
1/2	.53	5 1/4	2.94	57.	13
3/4	.49	5	2.76	53.	12 1/2
7/8	.44	4 3/4	2.35	45.	12
1	.41	4 1/2	2.16	41.	11 1/2
1 1/8	.38	4 1/4	2.	38.	11
1 1/4	.35	4	1.63	31.	10
1 1/2	.33	3 3/4	1.47	28.	9 1/4
1 3/4	.31	3 1/2	1.33	26.	8 3/4

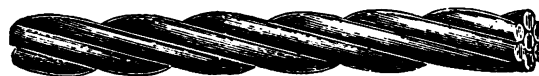
GALVANIZED CAST STEEL FOR YACHT RIGGING AND GUY ROPE



**FIG. 1413 1/2
COMPOSED OF 6 STRANDS, HEMP CENTER, 7 TO 19 WIRES TO
THE STRAND**

Diameter, Inch	Per Foot		Circumference, Inch	Weight Per Foot, Lbs.	Breaking Strain in Tons of 2,000 Lbs.	Circumference in Inches of New Manila Rope of Equal Strength
	With 19 Wires to the Strand	With 7 Wires to the Strand				
1 1/4	\$0.50	\$0.47	4	2.45	42.	13
1 1/2	.46	.44	3 3/4	2.21	38.	12
1 3/4	.41 3/4	.39 1/2	3 1/2	2.	34.	11
1 7/8	.38	.35	3 1/4	1.77	31.	10
2	.34	.31 3/4	3	1.58	28.	9
2 1/8	.26 1/4	.24 3/4	2 3/4	1.20	22.	8 1/2
2 1/4	.23 1/2	.22	2 1/2	1.03	19.	8
2 1/2	.20 3/4	.18 1/2	2 1/4	.89	16.8	7
2 3/4	.15 1/4	.13	2	.64	11.7	6
2 7/8	.13	.11	1 3/4	.49	9.	5 1/4
3	.12	.08 3/4	1 1/2	.39	7.	4 3/4
3 1/8	.11 1/2	.08	1 3/8	.34	6.	4 1/2
3 1/4	.11	.07	1 1/4	.30	5.	4 1/4
3 1/2	.10 1/4	.06	1 1/8	.22	4.2	3 3/4
3 3/4	.10	.04 3/4	1	.15	3.2	3

GALVANIZED STEEL WIRE STRAND



**FIG. 1414 1/2
SPAN WIRE AND OTHER PURPOSES, COMPOSED OF 7 WIRES
TWISTED TOGETHER**

Diameter, inch	Per 100 Feet	Weight Per 1000 Feet, Lbs.	Breaking Strain Lbs.
1/2	\$5.50	510	8,500
3/8	4.50	415	6,500
5/8	3.50	295	5,000
1	2.50	210	3,800
1 1/4	1.75	125	2,300
1 1/2	1.50	95	1,800
1 3/4	1.25	75	1,400
2	1.15	55	900
2 1/8	1.00	32	500
2 1/4	.80	20	400

ROPE

MANILA ROPE

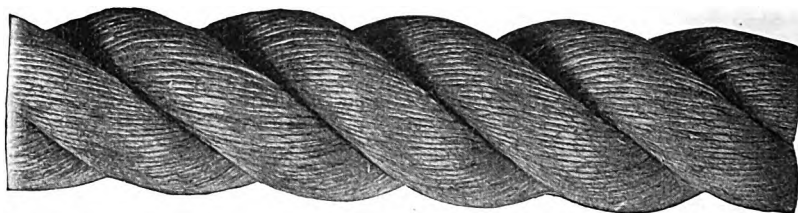


FIG. 1439

Manila, sisal and jute rope weigh about alike. Tarred hemp cordage will weigh about one fourth more. The relative strength of manila to sisal is about as 7 is to 5.

Manila Rope, Base pound..... \$. Sisal Rope, Base pound..... \$.

ADVANCES OVER BASE

$\frac{5}{8}$ -in. diameter or 2-in. circumference	Manila Base \$.005	Sisal Base \$.01
$\frac{1}{8}$, $\frac{1}{2}$ and $\frac{3}{4}$ -inch diameter		
12 Thd. ($\frac{3}{8}$ -in. diam.) & 15 Thd. Fine		
9 Thd. & 6 Thd. ($\frac{1}{4}$ & $\frac{1}{8}$ -in. diam.) .....	.015	.02
6 Thd. Fine ($\frac{1}{8}$ -in. diam.) .....	.02	

APPROXIMATE WEIGHT AND STRENGTH

Diam. Inches	Circumference Inches	No. of Feet in 1 Lb.	Full Coils		Strength of New Manila Rope, Lbs.	Diam. Inches	Circumference Inches	No. of Feet in 1 Lb.	Full Coils		Strength of New Manila Rope, Lbs.
			Length Feet	Weight Pounds					Length Feet	Weight Pounds	
$\frac{3}{8}$	6-Thd. Fine	75	2280	30	500	$1\frac{1}{4}$	$3\frac{3}{4}$	$2\frac{1}{8}$	1200	510	12500
$\frac{1}{4}$	6 " "	55	2600	50	620	$1\frac{3}{8}$	$4\frac{1}{4}$	$1\frac{9}{10}$	1200	660	14000
$\frac{3}{8}$	9 " "	41	1870	55	1000	$1\frac{1}{2}$	$4\frac{1}{2}$	$1\frac{1}{2}$	1200	775	17000
$\frac{1}{2}$	12 " "	26	1690	65	1275	$1\frac{5}{8}$	5	$1\frac{1}{8}$	1200	950	20000
$\frac{5}{8}$	$1\frac{1}{4}$	19	1400	75	1875	$1\frac{3}{4}$	$5\frac{1}{2}$	1	1200	1150	25000
$\frac{3}{4}$	$1\frac{1}{2}$	$13\frac{1}{2}$	1200	92	2400	2	6	10 in.	1200	1376	30000
$\frac{7}{8}$	$1\frac{3}{4}$	10	1200	130	3300	$2\frac{1}{8}$	$6\frac{1}{2}$	$8\frac{3}{8}$ "	1200	1600	33000
1	2	$7\frac{1}{2}$	1200	160	4000	$2\frac{1}{4}$	7	$7\frac{7}{8}$ "	1200	1850	37000
$1\frac{1}{8}$	$2\frac{1}{4}$	6	1200	200	4700	$2\frac{1}{2}$	$7\frac{1}{2}$	$6\frac{1}{2}$ "	1200	2200	43000
$1\frac{1}{4}$	$2\frac{1}{2}$	5	1200	250	5600	$2\frac{3}{8}$	8	$5\frac{5}{8}$ "	1200	2550	50000
$1\frac{1}{2}$	$2\frac{3}{4}$	4	1200	290	6500	$2\frac{1}{2}$	$8\frac{1}{2}$	5 "	1200	2850	56000
$1\frac{3}{4}$	3	$3\frac{3}{4}$	1200	350	7500	3	9	$4\frac{1}{2}$ "	1200	3150	62000
2	$3\frac{1}{4}$	$2\frac{7}{8}$	1200	400	8900	$3\frac{1}{8}$	$9\frac{1}{2}$	4 "	1200	3470	68000
$2\frac{1}{8}$	$3\frac{1}{2}$	$2\frac{1}{2}$	1200	450	10500	$3\frac{3}{8}$	10	$3\frac{5}{8}$ "	1200	3850	75000

OIL WELL DRILLING CABLE

"PURPLE THREAD"

Manufactured from superior Cebu hemp, characterized by its toughness and wearing qualities.

Drilling Cable differs from ordinary rope in that while ordinary rope is composed of three strands laid together, the above rope is composed of three ropes of three strands, each laid together with a very hard lay, so that it will resist the continual wear and hard usage to which it is subjected.

The United States Navy Standard for working strain is one-half the breaking strain for hoisting purposes where work is not continuous, but to get the best results from cables they should not be subjected to more than 5 per cent. of their breaking strain.

We handle all descriptions of both cable-laid and ordinary ropes for use upon oil well drilling rigs and are prepared to furnish all such rope upon the shortest notice.



FIG. 1440
PURPLE THREAD DRILLING
CABLE — $2\frac{1}{4}$ INCHES DIAM.
3,000 FEET LONG

APPROXIMATE WEIGHT, LENGTH AND STRENGTH OF OUR OIL-WELL DRILLING CABLES

Diameter in Inches	Circumference in Inches	No. of Lbs. per Foot	Diameter in Inches	Circumference in Inches	No. of Lbs. per Foot
$\frac{3}{4}$	$2\frac{1}{4}$	.259	$1\frac{3}{4}$	$5\frac{1}{4}$	1.28
$\frac{7}{8}$	$2\frac{3}{4}$	.354	$1\frac{7}{8}$	$5\frac{1}{2}$	1.47
1	3	.462	2	6	1.58
$1\frac{1}{8}$	$3\frac{1}{2}$	.505	$2\frac{1}{8}$	$6\frac{1}{2}$	1.65
$1\frac{1}{4}$	$3\frac{3}{4}$	.617	$2\frac{1}{4}$	7	1.79
$1\frac{1}{2}$	$4\frac{1}{2}$	.949	$2\frac{1}{2}$	$7\frac{1}{2}$	2.33
$1\frac{3}{4}$	5	1.11			

Weights of rope are liable to vary either way.

COPPER, IRON, TINNED AND GALVANIZED SASH CORD

FOR BELL ROPE



FIG. 1436

COMPOSED OF 6 STRANDS AND A COTTON CENTER, 7 WIRES TO THE STRAND

Diameter Inch	Price, per Foot			Weight per Foot, Pounds		Approximate Breaking Strength, lbs.		
	Iron	Tinned or Galvanized Iron	Copper	Iron	Copper	Iron		Bright Copper
						Bright	Annealed	
1/4	\$0.01 1/4	\$0.01 3/4	\$0.03	.006	.007	262	132	140
3/8	.01 1/2	.02	.03 1/2	.014	.016	510	280	272
1/2	.01 3/4	.02 1/4	.04 1/2	.025	.029	790	467	435
5/8	.02 1/4	.03	.06	.056	.064	1,417	947	792
3/4	.02 3/4	.03 1/2	.07 1/2	.076	.087	1,809	1,254	1,022
7/8	.03	.04	.09	.100	.115	2,200	1,600	1,265

COTTON SASH CORD

FIG. 1437

Size Nos.	White Cotton—Braided						White Cotton Braided and Spotted			
	6	7	8	10	12	14	7	8	10	12
Diameter, inches	1/8	3/8	1/4	5/16	3/8	7/8	3/8	1/2	5/8	3/4
Minimum Dia. of Pulley allowable, in.	1 1/2	1 3/4	2	2 1/2	3	4	1 3/4	2	2 1/2	3
Average number of feet, per pound	66	55	44	27	20	14	55	44	27	20
Average wt. 100-ft. hanks, per doz. lbs.	18	22	27	44	60	84	22	27	44	60
For Sash Weight, pounds	0 to 5	5 to 12	12 to 25	25 to 40	40 to 50	50 to 60	5 to 12	12 to 20	30 to 40	40 to 50
50-ft. Hanks, per pound	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
100 ft. Hanks, per pound	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Coils, 1000 to 1500 ft. Average per lb.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....

All above, two hanks connected; one dozen hanks in a bundle. 1000 to 1500 feet in a coil.

DODGE AA-A1 ROPE DRESSING

FOR COTTON OR MANILA ROPES



FIG. 1438

This dressing forms an elastic coat over the surface of the rope, practically sealing it up, and preventing the deterioration of the interior lubrication due to evaporation and otherwise. It reduces the abrasive contact and wear between the rope and the sheaves, it secures better adhesion of the rope in the grooves, and on outdoor drives the rope is made practically impervious to moisture.

Dodge AA-A1 dressing is put up in sizes of pails, weighing 5 pounds and 10 pounds, respectively. 10 pounds is about equal to one gallon. Full directions for use will be found on the label of each can.

About 10 pounds should be ordered for each 500 feet of 1 1/4 inch rope.

Price per pound..... \$0.90

COMPOUNDS FOR WIRE ROPE**SPECIFIC USES**

- No. 1 Lubricator—Apply Hot
For mines and General Hoisting Purposes.
No. 2 Plumbago—Apply Cold
For Derricks, Cranes and wherever hand applications are necessary.
No. 3 Protector—Apply Hot
For Dredges, Water Shafts, and Ropes Run in Water.

PRICE PER POUND

	Bbls.	1/2bbls.	50lb.	25lb.	10lb.
	400 lbs.	200lbs.	Cans	Cans	Cans
No. 1 Lubricator.....	\$0.15	\$0.17	\$0.20	\$0.23	\$0.26
No. 2 Plumbago Grease.....	.19	.21	.24	.25	.27
No. 3 Protector.....	.20	.22	.26	.30	.32

ONEIDA STEEL SPLIT PULLEYS

WITH STRAIGHT OR CROWN FACE



FIG. 1441 1/2

In the Oneida Steel Pulley double arms are provided beginning at 8 inch face in the smaller sizes, 10 and 12 inch face in the medium sizes and 14 inch face in the larger sizes. Other makes of pulleys do not start using the double arm construction until the width of face reaches 18 inches.

SIZES 3, 4 AND 5 INCH DIAMETER, 6 INCH FACE—FIG. 1441 1/2

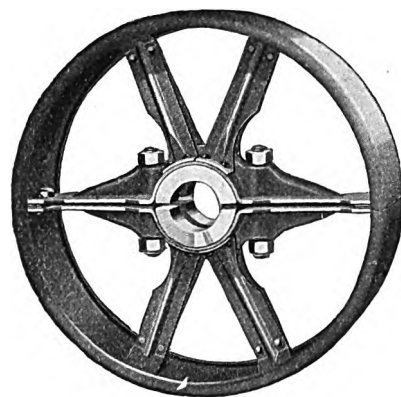


FIG. 1441

These sizes fill a long-felt want for a strong, efficient, satisfactory small pulley. Are suitable for use on small motors, dynamos, wood or metal working machinery, and in fact, in all places requiring a strong, well balanced, efficient small pulley.

The compression bolts (reached directly and easily through holes in the face) have special, milled, square heads and are readily tightened with malleable socket wrench furnished free with each pulley.

STANDARD BORES

Three inch pulleys have hubs three inches long and Standard Bore of $1\frac{1}{4}$ inches. Four and five inch pulleys have standard bore of $1\frac{1}{4}$ inches and hubs 3 inches long. Interchangeable metal bushings are furnished for all shaft sizes in sixteenths. One bushing and the socket wrench is supplied free with each pulley.

SIZES OVER 5 INCH DIAMETER, 6 INCH FACE

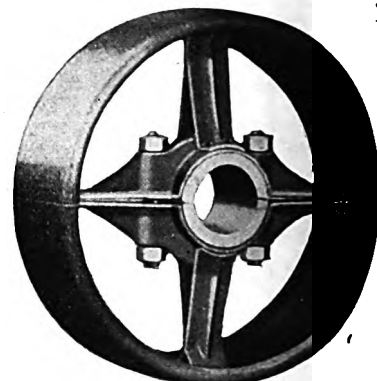


FIG. 1442 1/2



FIG. 1442

Fig. 1442 1/2: Shows construction in sizes from 9 inches to 11 inches inclusive in diameter, which are made with the "G" hub, having standard bore of $3\frac{1}{2}$ inches, hubs $3\frac{3}{8}$ inches long.

Sizes 6 inches and 7 inches in diameter are of similar design except that they are built without braces and with "F" hub, having standard bore of $2\frac{1}{4}$ inches and hub 3 inches long.

Fig. 1441: Oneida Pulley as made in sizes 12 inches to 17 inches in diameter with double rim braces. Built with "G" hub having standard bore of $3\frac{1}{2}$ inches, $3\frac{3}{8}$ inches long. Made with as many sets of arms and hubs as the width of face requires.

Fig. 1442: Oneida Pulley as made in sizes over 17 inches in diameter. Standard bore is $3\frac{1}{2}$ inches in diameter in sizes to 34 inches diameter, and $4\frac{1}{4}$ inches in diameter in sizes larger than 34 inches.

In sizes 40x8 and larger auxiliary arms are provided giving additional support to the rim at the partings which are located close to the main arms. This obviates any possibility of vibration from centrifugal or centripetal strains.

Universal Equipment: The wide range of sizes—from 6 inch diameter, 2 inch face, to 168 inch diameter, 40 inch face—make possible equipping entire plants with one make of pulley. Economical, efficient and neat appearing.

Strength with Light Weight: The lightest belt pulley made—and the strongest. No revolving superfluous pulley weight. Less weight, less friction in shaft journals—and less power loss.

Perfect Oval Crown: Greatest possible belt grip or adhesion. Transmits maximum power at minimum expense of belt pull or tension. Loose belts mean less bearing friction and saving of belts.

Double Arms: The right design and substantial construction throughout. Two sets of arms to support rim, where others have only one. Interlocking rim plates at partings make rim practically continuous, with least vibration from strain.

Strong Windcutting Arms: Securely riveted to broad bearing of special fish-plates. Stronger than wood and cast iron, and set edgewise, offering little resistance to air.

Rivets that Cannot Shear: Metals first stamped male and female—no lateral or shearing strain on rivets.

No Setscrews or Keyways: Pulley held to shaft by compression of hub. No mutilated shafts, or pulleys running out of true

Main Drives in Steel: Design so practical that Oneidas are successfully made as big as 168 inches diameter and 40 inch face—light, strong, split.

PRICE LIST ONEIDA STEEL SPLIT PULLEYS

Dia. in in.	Width of Face in Inches									
	2-inch	3-inch	4-inch	5-inch	6-inch	8-inch	10-inch	12-inch	14-inch	16-inch
3	\$2.40	\$2.52	\$2.68	\$3.00	....	....	....	....	....
4	2.52	2.64	2.75	3.10	....	....	....	....	....
5	2.64	2.75	2.87	3.25	....	....	....	....	....
6	\$3.15	3.30	3.45	3.75	4.05	\$4.60	\$5.20	\$5.90	....	....
7	3.22	3.38	3.60	3.90	4.20	4.80	5.40	6.10	....	....
8	3.30	3.45	3.75	4.05	4.35	4.95	5.60	6.25	....	....
9	3.38	3.60	3.90	4.20	4.50	5.10	5.75	6.35	....	....
10	3.45	3.75	4.05	4.35	4.65	5.25	5.90	6.45	....	....
11	3.65	3.90	4.20	4.50	4.80	5.40	6.00	6.90	....	....
12	3.90	4.20	4.63	4.80	5.33	5.78	6.45	7.65	\$9.00	\$10.25
13	4.05	4.35	4.80	5.20	5.62	6.43	7.20	8.40	9.50	10.75
14	4.20	4.50	5.20	5.65	6.15	7.05	8.03	9.00	10.00	11.25
15	4.65	5.45	5.80	6.55	7.65	8.80	9.75	10.75	12.00
16	4.95	5.75	6.10	6.90	8.25	9.45	10.50	11.50	12.65
17	5.25	6.00	6.50	7.28	8.78	10.05	11.25	12.40	13.65
18	5.55	6.38	7.00	7.65	9.30	10.65	12.00	13.25	14.50
19	5.80	6.75	7.50	8.25	10.13	11.25	12.90	14.20	15.60
20	6.00	7.50	8.10	9.00	10.73	12.00	14.25	15.30	16.90
21	6.25	8.00	8.90	9.60	11.25	12.98	15.60	18.00	20.55
22	6.50	8.55	9.50	10.28	12.00	14.10	16.80	19.50	21.30
23	7.00	8.70	9.90	10.58	12.60	14.75	18.00	21.00	24.30
24	7.50	8.90	10.00	10.95	13.20	15.68	19.05	22.65	26.25
25	9.20	10.25	11.45	13.80	16.40	20.20	24.50	29.25
26	9.55	10.50	11.95	14.40	17.10	21.30	26.25	31.20
28	10.80	11.70	12.90	15.45	18.15	22.90	28.50	34.50
30	12.00	12.90	14.10	17.25	19.90	24.75	31.50	38.10
32	13.20	14.10	15.45	19.35	22.50	26.85	34.15	41.65
34	14.40	15.75	17.25	21.75	25.60	30.00	36.75	45.00
36	15.90	17.85	19.50	24.00	28.65	33.75	39.75	48.60
38	19.50	20.65	21.75	26.40	31.05	37.15	42.75	51.75
40	21.00	22.75	24.00	28.50	33.75	40.15	46.50	55.15
42	23.25	24.85	26.25	32.25	37.50	43.50	50.25	57.75
44	29.25	35.62	41.25	47.25	54.00	61.12
46	33.00	39.00	45.00	50.25	57.75	64.50
48	36.75	42.00	48.75	54.00	61.50	67.50
50	40.87	47.25	53.25	58.50	66.00	75.00
52	46.50	51.00	57.00	63.00	69.00	78.75
54	50.25	56.25	61.50	67.50	74.25	83.25
56	54.00	60.75	66.75	72.75	80.25	90.00
58	60.00	65.25	71.25	78.37	86.62	96.37
60	63.75	70.50	77.25	84.00	93.00	102.75
62	72.85	84.30	95.95	107.55	119.95
64	76.50	88.20	100.10	111.95	124.60
66	80.25	92.20	104.35	116.45	129.35
68	84.15	96.35	108.75	121.10	134.25
70	88.10	100.70	113.55	126.35	139.95
72	92.15	105.05	118.15	131.30	145.40
74	96.35	109.65	123.20	136.85	151.50
76	100.65	114.30	128.35	142.55	157.75
78	105.05	119.15	133.70	148.45	164.20
80	109.60	124.25	139.35	154.65	170.95
82	114.25	129.45	145.10	160.95	177.90
84	119.00	134.75	150.95	167.40	184.95
86	123.90	140.25	157.10	174.20	192.40
88	128.90	145.85	163.35	181.05	199.90
90	151.70	169.85	188.20	207.65
92	157.75	176.55	195.70	215.85
94	163.85	183.45	203.20	223.95
96	170.15	190.55	210.95	232.35
98	176.60	197.85	219.10	241.20
100	181.50	203.20	224.90	247.45
102	186.40	208.45	230.50	253.40
104	191.35	213.85	236.30	259.55
106	196.95	220.00	243.05	266.95
108	203.40	226.90	250.45	274.90
110	210.00	234.00	258.05	283.05

(Continued on next page)

See page 409 for chart showing standard bores, length of hubs on shaft and number and kind of centers or spiders.

Add 25 per cent to the list of next larger size for list price of odd sizes over 25 inches diameter. An extra charge will be made

Pulleys having bores larger than standard. Bushings with keyseats at small additional charge. See page 409.

PRICE LIST ONEIDA STEEL SPLIT PULLEYS (CONTINUED)

Dia. in Ins.	Width of Face, in Inches									
	2-inch	3-inch	4-inch	5-inch	6-inch	8-inch	10-inch	12-inch	14-inch	16-inch
112	....	....	....	....	....	....	\$216.85	\$241.45	\$266.15	\$291.75
114	....	....	....	....	....	....	....	248.90	274.15	300.30
116	....	....	....	....	....	....	....	256.50	282.30	309.00
118	....	....	....	....	....	....	....	264.20	290.50	317.65
120	....	....	....	....	....	....	....	271.95	298.70	326.40
126	....	....	....	....	....	....	....	290.00	316.00	363.00
132	....	....	....	....	....	....	....	307.00	335.00	383.00
138	....	....	....	....	....	....	....	324.00	352.00	402.00
144	....	....	....	....	....	....	....	341.00	370.00	421.00
Dia. in Ins.	18-inch	20-inch	22-inch	24-inch	26-inch	28-inch	30-inch	32-inch	34-inch	36-inch
	18-inch	20-inch	22-inch	24-inch	26-inch	28-inch	30-inch	32-inch	34-inch	36-inch
24	\$29.92	\$34.50	....	....	....	....	....	....	....	....
25	35.05	39.50	....	....	....	....	....	....	....	....
26	36.15	41.40	....	....	....	....	....	....	....	....
28	40.35	46.35	....	....	....	....	....	....	....	....
30	45.00	49.50	\$55.50	\$61.50	\$67.50	\$74.25	\$81.67	....	....	....
32	48.37	54.37	60.37	66.37	72.37	79.90	87.56	\$96.31	....	....
34	51.75	57.45	63.75	69.75	75.00	82.50	90.75	99.82	....	....
36	55.50	61.50	67.50	73.50	79.50	87.45	96.19	105.80	\$116.38	\$128.01
38	58.87	64.87	70.87	76.87	82.87	91.15	100.26	110.28	121.30	133.43
40	62.25	69.75	77.25	84.75	92.55	101.80	111.98	123.17	135.48	149.02
42	65.62	73.12	80.62	88.12	95.62	105.18	115.69	127.25	139.97	153.96
44	69.00	78.00	87.00	96.00	105.00	115.50	127.05	139.75	153.72	169.09
46	72.00	81.00	90.00	99.00	108.00	118.80	130.68	143.74	158.11	173.92
48	75.00	87.00	99.00	111.00	123.00	135.30	148.83	163.71	180.08	198.08
50	84.00	96.00	108.00	120.00	132.00	145.20	159.72	175.69	193.25	212.57
52	90.00	102.00	114.00	126.00	138.00	151.80	166.98	183.67	202.03	222.23
54	96.75	108.75	120.75	132.75	144.75	159.22	175.14	192.65	211.91	233.10
56	104.25	119.25	134.25	149.25	164.25	180.67	198.73	218.60	240.46	264.50
58	110.62	125.62	140.62	155.62	170.62	187.68	206.44	227.08	249.78	274.75
60	117.00	132.00	147.00	162.00	177.00	194.70	214.17	235.58	259.13	285.04
62	132.30	144.85	185.80	201.65	214.70	227.80	241.10	254.50	268.05	281.70
64	137.20	150.00	197.10	210.20	223.50	236.85	250.40	264.05	273.85	291.75
66	142.20	155.30	205.55	218.95	232.50	246.15	259.95	273.85	287.95	302.20
68	147.40	160.80	214.30	227.95	241.70	255.70	269.85	284.10	298.50	313.05
70	153.60	167.60	223.70	237.85	252.20	266.60	281.20	295.95	310.90	326.00
72	159.65	174.30	232.90	247.35	262.00	276.80	291.90	307.20	322.75	338.50
74	166.30	181.50	240.40	257.70	272.90	288.30	303.95	319.80	335.90	352.30
76	173.10	188.95	245.30	268.35	284.10	300.10	316.35	332.85	349.65	366.70
78	180.20	196.60	251.60	279.40	295.75	312.35	329.25	346.40	363.80	381.45
80	187.45	204.40	256.70	291.05	307.00	325.20	342.65	360.35	378.35	396.60
82	195.05	212.65	262.30	302.90	320.50	338.30	356.50	374.90	393.60	412.55
84	202.75	221.05	265.40	315.00	333.15	351.70	370.55	389.65	409.05	428.70
86	210.85	229.80	269.70	327.70	346.55	365.80	385.35	405.15	425.25	445.60
88	218.95	238.55	274.60	340.60	360.20	380.00	400.15	420.60	441.40	462.50
90	227.30	247.45	279.80	354.05	374.35	394.90	415.75	436.85	458.25	479.95
92	236.10	256.85	283.90	368.00	389.45	410.50	432.10	453.95	476.10	498.50
94	244.95	266.35	288.20	382.15	404.00	426.05	448.40	471.00	493.85	517.00
96	253.90	275.85	298.25	396.90	419.45	442.20	465.15	488.35	511.90	535.70
98	263.25	285.65	308.50	410.75	435.45	459.15	483.00	506.85	530.95	555.25
100	269.90	292.65	315.80	424.60	446.90	470.95	495.15	519.45	544.00	568.75
102	276.35	299.50	322.90	438.40	457.75	482.30	507.00	531.80	556.80	582.00
104	282.75	306.20	329.95	452.25	469.10	494.05	519.15	544.35	569.75	595.25
106	290.90	315.10	339.50	466.10	482.20	507.85	533.70	559.60	585.80	612.10
108	299.40	324.70	349.40	479.95	496.95	523.10	549.55	576.05	602.85	629.75
110	308.15	333.53	359.35	493.80	512.00	538.75	565.75	592.90	620.30	647.90
112	317.35	343.30	369.60	507.60	528.00	555.45	583.10	610.95	640.65	668.80
114	326.45	352.95	379.80	521.45	543.90	572.00	600.20	628.65	657.25	685.95
116	335.80	362.90	390.30	535.30	560.10	588.75	617.60	646.60	675.95	705.35
118	344.95	372.65	400.70	549.15	576.50	605.65	634.95	664.50	694.30	724.30
120	354.25	382.50	411.20	563.00	592.90	622.00	652.45	682.60	713.00	743.60
126	391.00	473.00	534.00	667.00	613.00	637.00	665.00	734.00	769.00	804.00
132	412.00	500.00	560.00	698.00	634.00	671.00	709.00	774.00	811.00	848.00
138	433.00	536.00	589.00	729.00	667.00	707.00	746.00	813.00	853.00	892.00
144	454.00	553.00	618.00	760.00	721.00	742.00	784.00	853.00	895.00	936.00

See page 409 for chart showing standard bores, length of hubs on shaft and number and kind of centers or spiders.

Add 25 per cent to the list of next larger size for list price of odd sizes over 25 inches diameter. An extra charge will be made for pulleys having bores larger than standard. Bushings with key seats at small additional charge. See page 409.

ONEIDA STEEL SPLIT PULLEYS

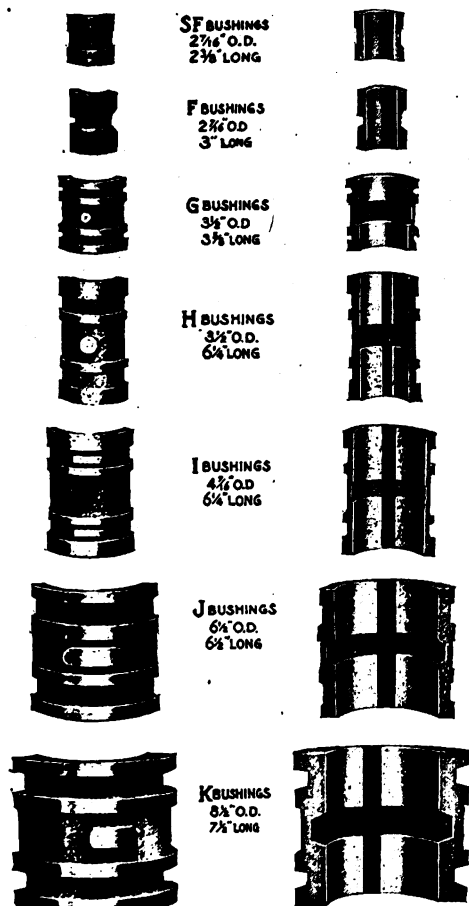


Illustration Showing Design and Comparative Sizes Oneida Bushings

FIG. 1443

Standard Hub Construction of Oneida Steel Split Pulleys

UP TO 16-INCH FACE, INCLUSIVE

Diam. in Inches	Width of Face in Inches															
	2	3	4	5	6	8	10	12	14	16						
3	L	N	N	N	N											
4	N	N	N	N	N											
5																
6	SF	F	F	F	F	2SF	2SF	2SF								
7	SF	F	F	F	F	2SF	2SF	2SF								
8	SF	G	G	G	G	GG	GG	GG								
9	SF	G	G	G	G	GG	GG	GG								
10	SF	G	G	G	G	GG	GG	GG								
11	SF	G	G	G	G	GG	GG	GG								
12	SF	G	G	G	G	GG	GG	GG	GG	GG						
13	SF	G	G	G	G	GG	GG	GG	GG	GG	GG	GG				
14	SF	G	G	G	G	GG	GG	GG	GG	GG	GG	GG	GG	GG		
15		G	G	G	G	GG	GG	GG	GG	GG	GG	GG	GG	GG	GG	GG
16		G	G	G	G	GG	GG	GG	GG	GG	GG	GG	GG	GG	GG	GG
17																
18		G	G	G	G	H	H	H	H	GG	GG	GG	GG	GG	GG	GG
19		G	G	G	G	H	H	H	H	GG	GG	GG	GG	GG	GG	GG
20		G	G	G	G	H	H	H	H	GG	GG	GG	GG	GG	GG	GG
21																
22		G	G	G	G	H	H	H	H	GG	GG	GG	GG	GG	GG	GG
23		G	G	G	G	H	H	H	H	GG	GG	GG	GG	GG	GG	GG
24		G	G	G	G	H	H	H	H	GG	GG	GG	GG	GG	GG	GG
26																
28																
30																
32																
34																
36																
38																
40																
42																
44																
46																
48																
50																
52																
54																
56																
58																
60																
62 to 70																
72 to 96																

GG means two separate G hubs.
 GGG " three " G "
 HH " two " H "
 HHH " three " H "

FIG. 1444

SCHEDULE OF SPECIALS AND EXTRAS

ONEIDA STEEL SPLIT PULLEYS

LIST PRICES SPECIAL BORES OR HUBS

	Extra Per Hub
Pulleys under 26-inch diameter, fitted with "I" hubs...	\$ 2.50
Pulleys 26 to 30-inch diameter, having faces 3, 4, 5, 6 and 8 inches wide, fitted with "I" hubs.....	3.00
Pulleys 26 to 30-inch diameter, having faces wider than 8 inches and all diameters over 30 inches, no extra charge for "I" hubs.	
Pulleys 60-inch diameter and under, fitted with "J" hubs (6 1/2-inch bore).....	5.00
Pulleys 60-inch diameter and under, fitted with "K" hubs	7.50
Pulleys any diameter, fitted with "O" 8-arm, high flange malleable hubs (4 1/4-inch bore).....	12.00
Pulleys under 96-inch diameter, fitted with "P" 8-arm, high flange malleable hubs (8 1/2-inch bore).....	15.00

PRICE LIST EXTRA BUSHINGS

For 3, 4 and 5 inch. dia. Pulleys.....	each	\$0.30
"F" "G" and "H" Bushings.....	each	.60
"I" Bushings.....	each	1.20
"J" Bushings.....	each	4.00
"K" Bushings.....	each	6.00
"L" and "N" Bushings (for National Pulleys).....	each	.30

KEYSEATING BUSHINGS

1 to 3-inch bore.....	net each	\$0.30
3 1/8 to 4 1/4-inch bore.....	net each	.40
Over 4 1/4-inch bore.....	net each	.50

EXTRA CHARGES FOR SPECIAL CONSTRUCTION

Double Flange Pulleys add.....	20% to list price
Odd sizes over 25-inch diameter add.....	25% to list price

ONEIDA STEEL PULLEYS, BORES AND BUSHINGS

By a simple system of cast iron and pressed steel bushings, Oneida Steel Pulleys can be made to fit from twenty-four to forty-eight different sizes of shafting (according to standard bore) by merely changing the bushing. These are supplied for all sizes of shafting in multiples of $\frac{1}{16}$ -inch from standard bore to the smallest size of shafting used.

Every bushing is accurately turned and bored, and cast on each bushing are driving bosses which fit into a round or oblong hole in the hub of the pulley, and virtually key it in place.

Bushings may be furnished also keyseated at a small additional charge, although the compression shaft fastening is generally ample and keyseating is not ordinarily required. A complete set of bushings is furnished free with each pulley. (See page 409 for prices on extra bushings.)

Standard hubs and bores and the bushings used in connection with them are known by symbols expressed by letters, as follows:—

All 2-inch face pulleys in diameters from 6 to 14 inches inclusive are built with the S. F. hub which is $2\frac{3}{8}$ inches long, have a standard bore of $2\frac{1}{16}$ inches and take the symbol S. F. bushings.

Pulleys 6 and 7 inches in diameter, 3 inch face and wider are built with the "F" hub which is 3 inches long with a standard bore of $2\frac{1}{16}$ inches and take the symbol "F" bushing. Sizes having faces from 8 to 12 inches inclusive are built with double arms or two spiders.

Pulleys 8 to 17 inches in diameter inclusive, take the "G" hub $3\frac{5}{8}$ inches long, having a standard bore of $3\frac{1}{2}$ inches and in these diameters pulleys are made single, double or triple arms according to the width of face.

Pulleys from 18 to 34 inches diameter inclusive, take the "G" hub $3\frac{5}{8}$ inches long, with a standard bore of $3\frac{1}{2}$ inches in the narrow widths of face and the "H" hub which is $6\frac{1}{4}$ inches long with a standard bore of $3\frac{1}{2}$ inches in faces 6, 8 and 10 inches wide. Pulleys having faces 12, 14 and 16 inches wide are built with double "G" or "H" hubs and still wider face, with triple "H" hubs. Symbol "G" and "H" bushings are used in connection with above hubs.

Pulleys from 36 to 48 inches diameter in the narrow widths of face take the "H" hub $6\frac{1}{4}$ inches long, and a standard bore of $3\frac{1}{2}$ inches and in the wider faces take the "I" hub $6\frac{1}{4}$ inches

long, $4\frac{1}{16}$ inch standard bore. Pulleys 14 to 24 inch face are built with double "I" hubs. From 26 to 34 inch face with triple "I" hubs, wider faces with quadruple "I" hubs. Symbol "H" and "I" bushings are used in connection with above hubs.

Pulleys 48 to 60 inches diameter inclusive are built with the "I" hub $6\frac{1}{4}$ inches long, having a standard bore of 4 inches and are made single, double, triple or quadruple arm, according to the width of face. Symbol "I" bushings are used in connection with above hubs.

Pulleys 61 inches and larger may have the "I" hub 69 inches long, $4\frac{1}{16}$ inch standard bore or the "J" hub $6\frac{1}{2}$ inches long, $6\frac{1}{2}$ inch standard bore or the "K" hub $7\frac{1}{2}$ inches long, $8\frac{1}{2}$ inch standard bore and with as many hubs or sets of arms as the width of face requires. No extra charge is made for "J" and "K" hubs in sizes over 60 inches in diameter.

See page 409 for chart showing standard bores, length of hubs on shaft and number and kind of hubs and spiders.

SPECIAL BORES

Sizes 14 inches and larger in diameter regularly made with "G" and "H" hubs can be supplied with the "I" hub ($4\frac{1}{16}$ inch standard bore) at a small additional charge.

Pulleys 17 inches and larger in diameter regularly built with "G", "H" and "I" hub may be built to order with the "J" hub ($6\frac{1}{2}$ inch standard bore) or the "K" hub ($8\frac{1}{2}$ inch standard bore) at a small additional charge.

EXTREME WIDTH MEASUREMENTS OF ONEIDA RIMS

The formation of the bead on either side of Oneida Steel Pulley Rims causes these to overrun the nominal face width as set forth below.

Pulleys made with SF hubs.....	$\frac{5}{16}$ inc
Pulleys made with F hubs.....	$\frac{1}{8}$ inc
Pulleys made with G hubs.....	1 inc
Pulleys made with H hubs.....	1 inc
Pulleys made with I hubs.....	1 inc
Pulleys made with J hubs.....	1 inc
Pulleys made with K hubs.....	1 inc

Please note, however, that only about one half of the excess width is effectual belt surface.

ONEIDA STEEL SPLIT PULLEYS

SPLIT BUSHINGS FOR TIGHT AND LOOSE PULLEYS



FIG. 1445

ONEIDA Split Loose Bushings are very easily placed upon the shaft, with a split pulley, without the necessity of taking down the shaft or disturbing any of the other equipment.

They are cast in one piece, bored and turned and then split by fracture. The uneven, ragged edges bring the two halves together to a smooth, accurate fit. They are held in a secure position by the compression of the pulley hub.

A large reservoir in the center holds the lubricating oil. Circular and lengthwise grooves distribute it evenly in the bearing, returning it to the oil chamber when the pulley is not in motion. The oil chamber is filled through a convenient spring oiler.

Split Loose Bushings are made $2\frac{1}{8}$, $2\frac{1}{4}$, $\frac{3}{4}$, and $4\frac{1}{8}$ -inch diameter according to shaft size. The price list gives size of shaft and the length and outside diameter of the bushings.

PRICE LIST

Outside Diameter of Bushings, Inches	Bores of Bushings, Inches	Length of Bushings, Inches	List Price
2 $\frac{1}{8}$	1 to 1 $\frac{3}{4}$	4 $\frac{1}{2}$	\$3.45
		5 $\frac{1}{2}$	3.85
2 $\frac{1}{4}$	1 to 2 $\frac{1}{8}$	4 $\frac{1}{2}$	3.85
		5 $\frac{1}{2}$	4.50
		6 $\frac{1}{2}$	5.00
		7 $\frac{1}{2}$	5.50
		9 $\frac{1}{2}$	6.50
		10 $\frac{1}{2}$	7.00
		12 $\frac{1}{2}$	8.00
Bushings are used 1 $\frac{1}{2}$ inch longer than nominal face width of pulley.			
Outside Diameter of Bushings, Inches	Bores of Bushings, Inches	Length of Bushings, Inches	List Price
3 $\frac{1}{2}$	1 $\frac{1}{8}$ to 2 $\frac{3}{4}$	4 $\frac{1}{2}$	\$4.30
		5 $\frac{1}{2}$	4.95
		6 $\frac{1}{2}$	5.50
		7 $\frac{1}{2}$	6.50
		9 $\frac{1}{2}$	8.30
		10 $\frac{1}{2}$	9.50
		12 $\frac{1}{2}$	10.70
4 $\frac{1}{8}$	1 $\frac{1}{4}$ to 3 $\frac{1}{8}$	6 $\frac{1}{2}$	8.00
		7 $\frac{1}{2}$	9.00
		9 $\frac{1}{2}$	10.90
		10 $\frac{1}{2}$	12.20
		12 $\frac{1}{2}$	14.50

DIRECTIONS FOR ORDERING ONEIDA PULLEYS

All letter or telegraph orders should clearly specify the following:

1st: Diameter.

3rd: Calipered size of shaft.

2nd: Width of face.

4th: Whether crown or straight face

For shifting belts use straight face pulleys and for non-shifting belts use crown face pulleys.

Tight-and-loose pulleys should have crown faces.

Pulleys ordered without style of face specified will be furnished in the crown face.

APPROXIMATE WEIGHTS OF ONEIDA STEEL SPLIT PULLEYS

Diam. in Inches	Width of Face in Inches									
	2	3	4	5	6	8	10	12	14	16
6	3.8	4.3	4.6	5.1	5.7	8.	9.5	....	....	....
7	4.7	4.7	5.1	5.5	6.6	9.5	10.6	10.7	....	....
8	5.3	5.8	6.7	8.3	9.	13.7	15.6	17.5	....	....
9	6.	8.	8.5	10.6	11.5	18.3	20.	22.	....	....
10	6.5	8.2	9.	11.6	12.5	19.8	21.7	23.8	....	....
11	6.7	9.	9.8	12.7	14.	21.2	23.	26.2	....	....
12	7.	10.7	12.2	15.5	17.	25.6	28.2	31.3	34.5	36.
13	8.	11.8	13.	16.6	17.6	27.3	30.2	33.	36.	39.
14	8.2	12.	14.	17.3	19.	29.	32.5	34.6	37.7	41.3
15	....	13.8	15.3	18.5	20.3	32.	35.6	46.7	50.8	52.
16	....	14.7	16.5	20.	21.7	34.	37.6	49.5	52.	55.
17	....	15.	16.8	21.8	23.	36.	40.	50.8	54.	59.
18	....	26.2	28.	29.2	35.2	46.	49.	54.	81.	85.
19	....	27.	29.	30.8	35.8	48.8	50.5	55.	82.	87.
20	....	28.	29.3	31.6	37.3	48.5	52.8	57.	85.	88.
21	....	28.7	30.6	31.7	41.6	51.2	56.	60.	89.	94.
22	....	29.5	31.5	33.5	42.5	52.2	55.	61.	93.	100.
23	....	31.	32.8	34.5	43.5	53.3	58.	63.	94.	102.
24	....	31.5	33.7	35.	44.	55.3	60.	91.	95.	103.
26	....	33.6	35.7	38.8	49.	60.	66.	101.	108.	114.
28	....	35.6	37.8	40.5	52.2	64.	70.	104.	115.	120.
30	....	37.	43.2	46.6	61.	67.	72.	108.	119.	126.
32	....	39.	45.3	49.5	65.	70.	80.	112.	125.	130.
34	....	42.	48.6	52.8	64.	73.	82.	120.	128.	138.
36	....	45.7	50.5	56.	68.	103.	110.	118.	190.	200.
38	....	....	55.	59.	71.	105.	115.	123.	196.	204.
40	....	....	57.	62.	73.	113.	122.	130.	213.	219.
42	....	....	59.	64.	77.	119.	129.	138.	221.	225.
44	....	....	61.	66.	79.	121.	130.	143.	229.	235.
46	....	....	64.	69.	81.	127.	136.	145.	231.	245.
48	....	....	66.	70.	85.	130.	139.	154.	240.	246.
50	....	....	....	....	125.	135.	150.	157.	246.	257.
52	....	....	....	....	130.	140.	152.	163.	253.	271.
54	....	....	....	....	132.	147.	159.	171.	267.	280.
56	....	....	....	....	135.	151.	162.	172.	274.	281.
58	....	....	....	....	139.	153.	166.	179.	285.	287.
60	....	....	....	....	147.	163.	174.	285.	299.	303.
72	....	....	....	....	....	234.	245.	411.	440.	455.

Weights do not include bushings.

ONEIDA STEEL SPLIT PULLEYS

HORSE POWER OF STEEL PULLEYS AT 100 R. P. M.

Multiply the table H. P. by the R. P. M. of shaft that is to be used and divide by 100.

Diameter in Inches	Width of Face in Inches											
	3	4	5	6	8	10	12	14	16	18	20	24
	For Single 16 oz. Belts				For Double Leather Belts							
6	.6	.8	1.1	1.8	2.4	3.2	....	....	....	....	....	....
7	.7	.9	1.3	2.1	2.8	3.6	....	....	....	....	....	....
8	.8	1.1	1.4	2.4	3.2	4.4	7.0	....	....	....	....	....
9	1.0	1.3	1.7	3.0	4.0	5.2	8.5	....	....	....	....	....
10	1.1	1.4	1.8	3.3	4.5	5.6	9.0	....	....	....	....	....
11	1.3	1.6	1.9	3.6	4.8	6.4	9.5	....	....	....	....	....
12	1.4	1.8	2.1	5.6	7.0	8.4	11.2	12.6	14.0	....	....	....
14	1.5	2.0	2.4	6.0	7.8	9.6	12.0	13.8	15.6	....	....	....
16	1.7	2.3	2.5	6.8	8.5	10.2	13.6	15.3	17.0	....	....	....
18	1.9	2.5	3.1	7.6	10.0	12.4	15.2	17.6	20.0	....	....	....
20	2.1	2.8	3.5	8.4	11.2	14.0	16.8	19.6	22.4	....	....	....
22	2.3	3.1	3.8	9.2	12.3	15.4	18.4	21.5	24.6	27.6	30.8	36.8
24	2.5	3.3	4.1	10.0	13.3	16.6	20.0	23.3	26.6	30.0	33.2	40.0
26	2.7	3.6	4.5	10.8	14.5	18.2	21.6	25.3	29.0	32.4	36.4	43.2
28	2.9	3.9	4.8	11.6	15.5	19.4	23.2	27.1	31.0	34.8	38.8	46.4
30	3.1	4.1	5.4	12.4	16.6	20.8	24.8	29.0	33.2	37.2	41.6	49.6
32	3.4	4.5	5.6	13.6	18.0	22.4	27.2	31.6	36.0	40.8	44.8	54.4
34	3.5	4.7	5.9	14.0	18.8	23.6	28.0	32.8	37.6	42.0	47.2	56.0
36	3.7	5.0	6.2	14.8	19.9	25.0	29.6	34.7	39.8	44.4	50.0	59.2
38	4.0	5.3	6.7	16.0	21.4	26.8	32.0	37.4	42.8	48.0	53.6	64.0
40	4.2	5.6	6.9	16.8	22.3	27.8	33.6	39.1	44.6	50.4	55.6	67.2
42	4.4	5.9	7.6	17.6	23.5	29.4	35.2	41.1	47.0	52.8	58.8	70.4
44	4.6	6.1	7.8	18.4	24.6	30.8	36.8	43.0	49.2	55.2	62.6	73.6
46	4.7	6.3	7.9	18.8	25.2	31.6	37.6	44.0	50.4	56.4	63.2	75.2
48	5.0	6.8	8.3	20.0	26.7	33.4	40.0	46.7	53.4	60.0	66.4	80.0
50	5.2	7.0	8.7	20.8	27.8	34.9	41.6	48.6	55.7	62.4	67.8	83.2
52	5.4	7.2	9.1	21.6	29.0	36.4	43.2	50.6	58.0	64.8	73.8	86.4
54	5.7	7.6	9.4	22.8	30.2	37.7	45.6	53.0	60.5	66.4	75.4	91.2

Rule for finding Horse Power that Oneida Steel Pulleys will Transmit

Multiply the circumference of the pulley in feet, by the number of revolutions per minute, by the width of the pulley face in inches, by 85, and divide by 33,000. Thus:

$$\text{Horse Power} = \frac{C \times R \times W \times 85}{33,000}$$

STANDARD KEYSEATS AND KEYS "SF" "F" "G" "H" "I" "J" "K" ONEIDA BUSHINGS

Size of Shaft	2 1/8" Bushing Sym. "SF" & "F"		3 1/8" Bushing Sym. "G" & "H"		4 1/8" Bushing Symbol "I"		6 1/2" Bushing Symbol "J"		8 1/2" Bushing Symbol "K"	
	Size Keyseat	Size Key	Size Keyseat	Size Key	Size Keyseat	Size Key	Size Keyseat	Size Key	Size Keyseat	Size Key
1 1/8-1 1/8	1/4 x 1 1/8	1/4 x 1 1/8	....	....	....	....	....	....	....	....
1 1/8-1 3/8	3/8 x 1 1/8	3/8 x 1 1/8	....	....	....	....	....	....	....	....
1 1/8-1 5/8	3/8 x 1 1/8	3/8 x 1 1/8	....	....	....	....	....	....	....	....
1 1/8-1 7/8	1/2 x 3/4	1/2 x 1 1/8	1/2 x 3/4	1/2 x 1 1/8	....	....	....	....	....	....
1 1/8-2 1/8	1/2 x 1 1/8	1/2 x 3/8	....	....	....	....	....	....
2 1/8-2 3/8	1 1/8 x 1 1/8	1 1/8 x 3/8	....	....	....	....	....	....
2 1/8-2 5/8	5/8 x 1 1/8	5/8 x 1 1/8	....	....	....	....	....	....
2 1/8-2 7/8	3/4 x 1 1/8	3/4 x 1 1/8	....	....	....	....	....	....
2 1/8-3 1/8	3/4 x 1/2	3/4 x 1/2	....	....	....	....
3 1/8-3 5/8	7/8 x 1/2	7/8 x 1/2	1 1/8 x 1/8	1 1/8 x 1/8	....	....
3 1/8-3 7/8	7/8 x 1/8	7/8 x 1/8	1 1/8 x 1/8	1 1/8 x 1/8	....	....
3 1/8-4 1/8	1 x 1 1/8	1 x 1 1/8	....	....
4 1/8-4 7/8	1 1/8 x 3/8	1 1/8 x 3/8	....	....
4 1/8-5 1/4	1 1/4 x 1/8	1 1/4 x 1/8	....	....
5 1/8-5 3/4	1 3/8 x 1/8	1 3/8 x 1/8	1 3/8 x 1/8	1 3/8 x 1/8
5 1/8-6 1/4	1 1/2 x 1/8	1 1/2 x 1/8	1 1/2 x 1/8	1 1/2 x 1/8
6 1/8-6 3/4	1 1/2 x 1/2	1 1/2 x 1/2
6 1/8-7 1/4	1 1/2 x 1/2	1 1/2 x 1/2
7 1/8-7 3/4	1 5/8 x 1/8	1 5/8 x 1/8
7 1/8-8	1 3/4 x 1/8	1 3/4 x 1/8

Owing to the variation in the thickness of cast iron and steel bushings necessary to accommodate the many different sizes of shafting, it is not practical to furnish keyseats to take square keys.

Above is scheduled standard keyseats and size of key to be used. A small extra charge is made for keyseating bushings and for keys, but the latter are not furnished unless so specified in orders. See page 409.

DODGE "STANDARD" SPLIT IRON PULLEYS

WITH STANDARDIZED BORES AND INTERCHANGEABLE METALLIC BUSHINGS

Balanced to run { 6" to 9" diameters, 600 R.P.M. 2 1/8-inch bore.
10" to 23" diameters, 500 R.P.M. 2 1/8-inch bore.
24" to 36" diameters, 400 R.P.M. 3 1/8-inch bore.
37" to 54" diameters, 300 R.P.M. 3 1/8-inch bore.

PRICE LIST

Diam.	Width of Face									
	3	4	5	6	7	8	9	10	12	14
6	\$3.25	\$3.85	\$4.05	\$4.30	\$4.95	\$5.20	.....	.....	.....	.....
7	3.40	4.00	4.25	4.50	5.15	5.40	.....	.....	.....	.....
8	3.55	4.20	4.45	4.70	5.35	5.60	.....	.....	.....	.....
9	3.70	4.35	4.60	4.90	5.60	5.90	.....	.....	.....	.....
10	3.85	4.50	4.80	5.15	5.85	6.20	\$6.55	\$6.90	.....	.....
11	4.20	5.15	5.45	5.80	6.80	7.20	7.50	7.80	.....	.....
12	4.35	5.35	5.70	6.05	7.05	7.40	7.80	8.20	.....	.....
13	.....	5.55	5.90	6.30	7.30	7.75	8.10	8.55	10.80	.....
14	.....	5.75	6.10	6.55	7.55	8.05	8.45	8.95	11.25	.....
15	.....	5.95	6.35	6.80	7.90	8.35	8.80	9.30	11.50	13.15
16	.....	6.15	6.60	7.10	8.20	8.70	9.15	9.70	12.00	13.80
17	.....	6.40	6.90	7.40	8.55	9.05	9.60	10.15	12.50	14.40
18	.....	6.65	7.15	7.70	8.90	9.45	10.00	10.60	13.10	15.15
19	.....	7.35	8.65	9.25	10.50	11.10	11.70	12.35	15.35	17.60
20	.....	7.60	8.95	9.60	10.90	11.55	12.20	12.90	16.00	18.00
21	.....	7.90	9.25	9.95	11.30	12.00	12.70	13.45	16.65	18.80
22	.....	8.20	9.55	10.30	11.70	12.45	13.20	14.00	17.30	19.65
23	.....	8.45	9.90	10.65	12.10	12.90	13.70	14.55	18.00	20.45
24	.....	9.70	11.25	12.05	13.85	14.70	15.60	16.50	20.40	22.95
26	.....	10.50	12.05	13.00	14.85	15.95	16.90	18.00	22.25	24.90
28	.....	11.30	12.90	13.90	16.00	17.10	18.30	19.50	24.10	26.80
30	.....	12.15	13.85	14.95	17.15	18.40	19.70	21.15	25.85	28.80
32	.....	13.90	16.05	17.25	19.70	21.15	22.65	24.15	30.35	33.50
34	.....	14.90	17.10	18.50	21.10	22.60	24.30	25.85	32.30	35.70
36	.....	15.90	18.25	19.70	22.45	24.10	25.85	27.60	34.30	37.90
38	.....	19.05	21.45	23.10	27.85	28.95	30.80	32.70	40.15	44.00
40	.....	20.20	22.80	24.60	28.80	30.70	32.65	34.65	42.30	46.40
42	.....	21.40	24.20	26.10	30.45	32.45	34.50	36.60	44.50	48.80
44	.....	22.75	25.70	27.75	32.20	34.35	36.50	38.70	46.90	51.40
46	.....	24.15	27.20	29.35	33.95	36.25	38.50	40.85	49.30	54.10
48	.....	29.00	31.20	33.50	38.85	41.25	43.65	46.15	56.20	61.30
50	.....	.....	32.80	35.30	40.75	43.25	45.80	48.45	58.80	64.20
52	.....	.....	34.50	37.10	42.65	45.30	48.00	50.75	61.40	67.20
54	.....	.....	36.20	38.90	44.65	47.40	50.20	53.05	64.00	70.20

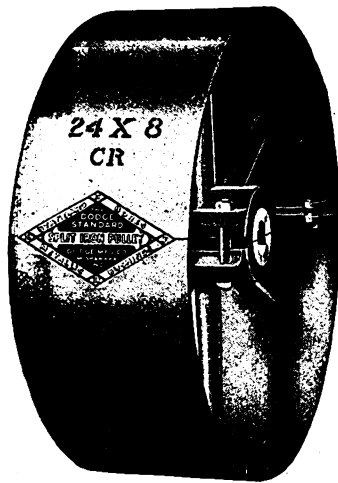


FIG. 1446

WITH INTERCHANGEABLE BUSHING SYSTEM

Certain prejudices exist in the general trade with regard to pulleys. Some customers prefer the wood split pulley and would make use of no other kind in their factory. On the other hand, other customers favor a metallic pulley, and there are of course some places where metallic pulley is absolutely essential.

Th Dodge "Standard" Split Iron Pulley is designed to meet this demand for a metallic pulley, which it does in a most successful and satisfactory manner.

BUSHINGS FOR DODGE "STANDARD" SPLIT PULLEYS



FIG. 1447

These bushings are made and finished whole, then cracked, and the fractured edges are dressed away slightly to provide for proper lapping clearance.

Two complete bushings are required for each pulley, one for each end of pulley hub.

PRICE LIST OF BUSHINGS, PER PAIR

Bushing Bore, Inches	Outside Diameter of Bushings			
	2 1/8 Inches	2 1/4 Inches	3 1/8 Inches	3 1/4 Inches
	Price	Price	Price	Price
1 1/8	\$.50	.....	.....	.....
1 1/4	.55	\$.80	.....	.....
1 1/2	.60	.85	.....	.....
1 3/4	.65	.90	\$1.30	.....
2	.70	1.00	1.35	\$1.80
2 1/8	.75	1.10	1.45	1.85
2 1/4	.....	1.20	1.55	1.95
2 1/2	.....	1.30	1.65	2.05
2 3/4	.....	.....	1.75	2.15
3	.....	.....	1.85	2.25
3 1/8	.....	.....	.....	2.35
3 1/4	.....	.....	.....	2.45

SPLIT PULLEYS MADE TIGHT AND LOOSE

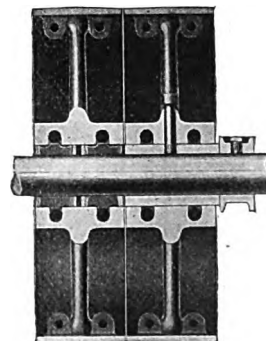


FIG. 1448

By the use of the Solid Iron Loose Sleeves, as shown on Page 416, these pulleys can be made in tight and loose form providing the faces of the pulleys are 4 inches or more from 6 inches to 24 inches diameters, and 5 inches or more 25 inches to 36 inches diameters.



FIG. 1449

DODGE "INDEPENDENCE" WOOD SPLIT PULLEYS

STANDARD CONSTRUCTION

All pulleys of diameters and faces herein listed—are standard and not subject to any extra charges when made without special features and when bored as follows:

3 inch diameter.....	1½ inch bore	} With Interchangeable Bushing System
4 " ".....	2 " "	
5 to 7 " ".....	2 ¼ " "	
8 to 23 " ".....	3 " "	
24 to 48 " ".....	3½ " "	
50 to 72 " ".....	4½ " "	} With Interchangeable Bushing System
72-inch diameter up to 12-inch face.....	4½ " "	

One pair of bushings furnished without charge with each pulley above, to bush same to proper shaft size.

72-inch diameter, 13-inch face and wider.	Bored to shaft size up to 6 inch
73 to 96-inch.....	Bored to shaft size up to 6 inch
97 to 120-inch.....	Bored to shaft size up to 7½ inch

Bored to shaft size up to 6 inch
Bored to shaft size up to 6 inch
Bored to shaft size up to 7½ inch

CONSTRUCTION

8-INCHES & SMALLER. SOLID TYPE

TWO-ARM

9 to 30" dia., inc. all faces.	
32 to 36" dia., inc. all faces up to 16" inc.	
38" dia., inc. all faces up to 10" inc.	
40" dia., inc. all faces up to 4" inc.	

FOUR-ARM

All pulleys having larger diameters and wider faces than two-arm pulley described. The system of interchangeable bushings used with these pulleys makes possible the application of the pulley upon any size of shaft within the range of the standard bores.

Prices given below include one bushing with each pulley.

Width of Face

Diam. Inches	3	4	5	6	8	10	12	14	16	18	20	22	24
4	\$ 2.80	\$ 2.90	\$ 3.10	\$ 3.30	\$ 3.70	\$ 4.10	\$ 4.50	.....	.....	.....	.....	.....	.....
5	2.85	2.95	3.20	3.40	3.85	4.30	4.75	.....	.....	.....	.....	.....	.....
6	2.90	3.00	3.25	3.50	4.00	4.50	5.00	.....	.....	.....	.....	.....	.....
7	2.95	3.05	3.35	3.60	4.15	4.70	5.25	\$ 5.80	.....	.....	.....	.....	.....
8	3.00	3.10	3.40	3.70	4.30	4.90	5.50	6.10	.....	.....	.....	.....	.....
9	3.10	3.25	3.60	3.90	4.55	5.20	5.85	6.50	.....	.....	.....	.....	.....
10	3.25	3.40	3.75	4.10	4.80	5.50	6.20	6.90	\$ 7.60	.....	.....	.....	.....
11	3.50	3.70	4.10	4.50	5.30	6.10	6.90	7.70	8.50	.....	.....	.....	.....
12	3.75	4.00	4.45	4.90	5.80	6.70	7.60	8.50	9.40	\$10.30	.....	.....	.....
13	.....	4.30	4.80	5.30	6.30	7.30	8.30	9.30	10.30	11.30	.....	.....	.....
14	.....	4.60	5.15	5.70	6.80	7.90	9.00	10.10	11.20	12.30	\$13.40	.....	.....
15	.....	4.90	5.50	6.10	7.30	8.50	9.70	10.90	12.10	13.30	14.50	.....	.....
16	.....	5.20	5.85	6.50	7.80	9.10	10.40	11.70	13.00	14.30	15.60	\$16.90	.....
17	.....	5.50	6.20	6.90	8.30	9.70	11.10	12.50	13.90	15.30	16.70	18.10	.....
18	.....	5.80	6.55	7.30	8.80	10.30	11.80	13.30	14.80	16.30	17.80	19.30	\$20.80
19	.....	6.10	6.90	7.70	9.30	10.90	12.50	14.10	15.70	17.30	18.90	20.50	22.10
20	.....	6.40	7.25	8.10	9.80	11.50	13.20	14.90	16.60	18.30	20.00	21.70	23.40
22	.....	7.00	7.95	8.90	10.80	12.70	14.60	16.50	18.40	20.30	22.20	24.10	26.00
24	.....	7.70	8.80	9.90	12.10	14.30	16.50	18.70	20.90	23.10	25.30	27.50	29.70
26	.....	8.40	9.65	10.90	13.40	15.90	18.40	20.90	23.40	25.90	28.40	30.90	33.40
28	.....	9.10	10.50	11.90	14.70	17.50	20.30	23.10	25.90	28.70	31.50	34.30	37.10
30	.....	9.80	11.35	12.90	16.00	19.10	22.20	25.30	28.40	31.50	34.60	37.70	40.80
32	.....	10.50	12.20	13.90	17.30	20.70	24.10	27.50	30.90	34.30	37.70	41.10	44.50
34	.....	11.30	13.15	15.00	18.70	22.40	26.10	29.80	33.50	37.20	40.90	44.60	48.30
36	.....	12.10	14.10	16.10	20.10	24.10	28.10	32.10	36.10	40.10	44.10	48.10	52.10
38	.....	.....	.....	17.20	21.50	25.80	30.10	34.40	38.70	43.00	47.30	51.60	55.90
40	.....	.....	.....	18.30	22.90	27.50	32.10	36.70	41.30	45.90	50.50	55.10	59.70
42	.....	.....	.....	19.60	24.60	29.60	34.60	39.60	44.60	49.60	54.60	59.60	64.60
44	.....	.....	.....	20.90	26.30	31.70	37.10	42.50	47.90	53.30	58.70	64.10	69.50
46	.....	.....	.....	22.30	28.10	33.90	39.70	45.50	51.30	57.10	62.90	68.70	74.50
48	.....	.....	.....	23.80	30.00	36.20	42.40	48.60	54.80	61.00	67.20	73.40	79.60
50	.....	.....	.....	25.40	32.00	38.60	45.20	51.80	58.40	65.00	71.60	78.20	84.80
52	.....	.....	.....	27.10	34.10	41.10	48.10	55.10	62.10	69.10	76.10	83.10	90.10
54	.....	.....	.....	28.90	36.30	43.70	51.10	58.50	65.90	73.30	80.70	88.10	95.50
56	.....	.....	.....	30.80	38.60	46.40	54.20	62.00	69.80	77.60	85.40	93.20	101.00
58	.....	.....	.....	32.80	41.00	49.20	57.40	65.60	73.80	82.00	90.20	98.40	106.60
60	.....	.....	.....	34.90	43.50	52.10	60.70	69.30	77.90	86.50	95.10	103.70	112.30
62	.....	.....	.....	37.10	46.10	55.10	64.10	73.10	82.10	91.10	100.10	109.10	118.10
64	.....	.....	.....	39.40	48.80	58.20	67.60	77.00	86.40	95.80	105.20	114.60	124.00
66	.....	.....	.....	41.90	51.80	61.70	71.60	81.50	91.40	101.30	111.20	121.10	131.00
68	.....	.....	.....	44.50	54.90	65.30	75.70	86.10	96.50	106.90	117.30	127.70	138.10
70	.....	.....	.....	47.20	58.10	69.00	79.90	90.80	101.70	112.60	123.50	134.40	145.30
72	.....	.....	.....	50.00	61.40	72.80	84.20	95.60	107.00	118.40	129.80	141.20	152.60
78	.....	.....	.....	.....	71.90	84.80	97.70	110.60	123.50	136.40	149.30	162.20	175.10

DODGE "INDEPENDENCE" WOOD SPLIT PULLEYS

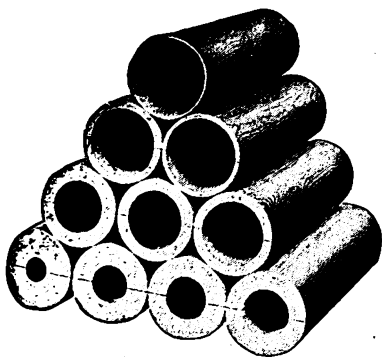


FIG. 1450

BUSHING SYSTEM

Pulley Diameter, Inches,	Standard Bore of Pulleys, Inches	Maximum Shaft Diameter for which Bushings are Made
3	1½	1⅜
4	2	1⅞
4½ to 7	2 ⅜	2 ⅜
7½ to 23	3	2⅞
23½ to 48	3½	3⅜
48½ to 72	4½	4⅜

In ordering Bushings please note:
Bushings will be furnished bored to suit any shaft size up to the maximum in each case.

An order for a Bushing should read: (1) BORE, (2) DIAMETER, (3) LENGTH.

PRICE LIST—EXTRA BUSHINGS

Length, Inches	Outside Diameter of Bushing					
	1½ Inches	2 Inches	2 ⅜ Inches	3 Inches	3½ Inches	4½ Inches
6	\$.20	\$.20	\$.30	\$.40	\$.50	\$.70
8	.30	.30	.40	.55	.65	.95
10	.40	.40	.50	.70	.85	1.20
12	.50	.50	.60	.80	1.00	1.40
14	.60	.60	.70	.95	1.15	1.65
16	.70	.70	.80	1.10	1.30	1.90
18	.80	.80	.90	1.20	1.50	2.10
20	.90	.90	1.00	1.40	1.70	2.40

These prices are for any bore ordered within the limits shown above.

For single bushings we make a minimum net charge of 15 cents each for 1½, 2 and 2 ⅜ inches; 25 cents each for 3 and 3½ inches, and 50 cents for 4½ inches, outside diameter.

Bushings having special outside diameters cannot be furnished on basis of above prices.

SPECIAL BORES

For boring pulleys to fit shaft when bore is less than standard or for boring pulleys larger than standard but smaller than extra large bores shown in the following table, add 10 per cent to regular list.

PERCENTAGE TO BE ADDED TO LIST

PULLEY DIAM. INCHES	15%	20%	25%	35%	50%	65%
	BORE IN INCHES					
Under 12	3 ⅞ to 4	4 ⅞ to 5	5 ⅞ to 6	.....	.....	.....
12 to 48	4 ⅞ to 4½	4 ⅞ to 6	6 ⅞ to 7½	7 ⅞ to 10	.....	.....
49 to 72	5 ⅞ to 6	6 ⅞ to 7½	7 ⅞ to 9½	9 ⅞ to 12	12 ⅞ to 15	15 ⅞ to 18
73 to 96	7 ⅞ to 8	8 ⅞ to 10	10 ⅞ to 12	12 ⅞ to 15	15 ⅞ to 18	18 ⅞ to 21
97 to 120	9 ⅞ to 10	10 ⅞ to 12½	12 ⅞ to 15	15 ⅞ to 18	18 ⅞ to 21	21 ⅞ to 25

ODD DIAMETERS

When in fractions of an inch, or in odd inches not listed, use list of next larger diameter.

ODD FACES

When ordering in fractions of an inch, or in odd inches not listed use list of next wider face.

OFF-SET HUBS

Add 10 per cent to final list.

FLANGED PULLEYS

Add to regular list prices as follows:

Single Flange, 20 per cent.

Double Flange, 25 per cent.

Triple Flange, 30 per cent.

STEP CONE PULLEYS

Treat each step as a separate pulley, combine the lists and add 50 per cent.

For base list prices, see Pages 414.

SOLID CAST IRON SLEEVES

FOR MAKING PULLEYS TIGHT AND LOOSE



FIG. 1452

These sleeves are made for use with the Wood Split Pulleys as shown on Page 414, and the Standard Iron Split Pulleys as shown on Page 413.

STANDARD SLEEVES ARE MADE AS FOLLOWS:

Bore	Outside Diam.	Bore	Outside Diam.
$1\frac{1}{8}$ to $1\frac{1}{4}$	$2\frac{1}{16}$	$1\frac{1}{4}$ to $2\frac{1}{8}$	$3\frac{1}{16}$
$1\frac{1}{4}$ to $2\frac{1}{8}$	$2\frac{1}{8}$	$2\frac{1}{8}$ to $2\frac{1}{2}$	$3\frac{1}{8}$

For price of split sleeves, double the price of solid sleeves. Use solid sleeves wherever possible.

When sleeves are fitted in pulleys by us, we furnish same with oil pipe, but oil pipe is not supplied with sleeves not fitted.

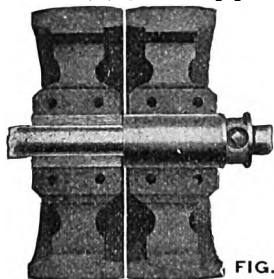


FIG. 1451

WOOD SPLIT PULLEYS TIGHT AND LOOSE

These pulleys can be furnished:

1. Both pulleys crown face.
2. Tight pulley crown face—loose pulley straight face and of smaller diameter.

Unless otherwise ordered we will furnish both pulleys with crown face.

The loose pulley is fitted with an iron sleeve—oil pipe and cap—grease cups are furnished at an extra cost.

DODGE IRON CENTER WOOD RIM PULLEYS

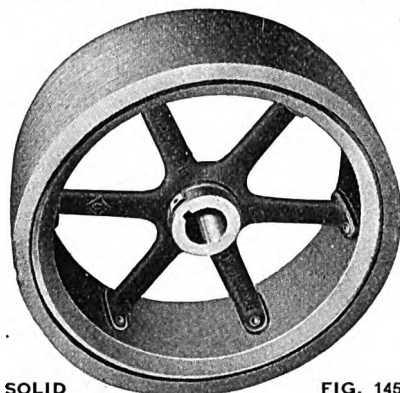
REGULAR PATTERN

Made in any size, any strength, for any speed, and for any service for which leather belting can be used.

One of these pulleys was tested to a rim speed of $5\frac{1}{2}$ miles per minute with no resultant damage.

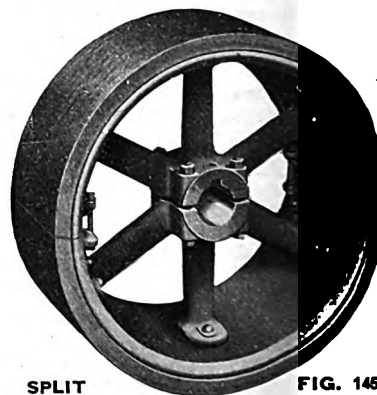
The combination of wood and iron is an engineering triumph, the wood rim gives high tractile efficiency, tests showing that it is superior to iron in the proportion of 46 to 22.

Lighter belts and less tension can be used with a corresponding reduction in pressure on bearings, all of which results in decreased friction.



SOLID

FIG. 1453



SPLIT

FIG. 1454



FIG. 1455

CAST IRON SOLID PULLEYS

We can supply on short notice cast iron pulleys, machine moulded, bored, turned and balanced to meet all requirements and conditions of service. When ordering standard pulleys specify diameter, width, and kind of face (whether straight or crown) bore, and whether keyseat, set screws or both are desired. When ordering special pulleys state all conditions and requirements fully or submit sketch.

SEE OUR LINES OF GENERAL MACHINERY,
PAGES 800 TO 899

YOU WILL FIND SOME VERY USEFUL INFORMATION TABLES ON PAGES NOS. 900
TO 930 INCLUSIVE

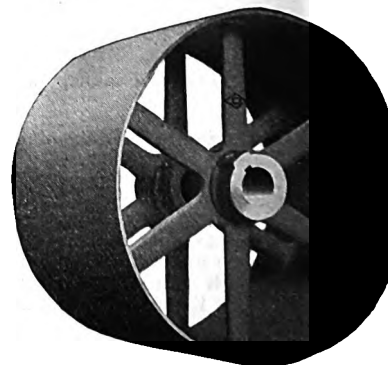


FIG. 1456

PRICE LIST OF SOLID CAST IRON SLEEVES

Outside Diam. Inches	Length of Sleeve Inches	For Pulley Face Inches	PRICE		
			Not Fitted	Fitted to Wood Pulley	Fitted to Std. Iron Split
$2\frac{1}{8}$	$3\frac{1}{2}$	3	\$2.20	\$3.20	.....
	$4\frac{1}{2}$	4	2.50	3.50	\$4.50
	$5\frac{1}{2}$	5	2.85	3.85	4.85
	$6\frac{1}{2}$	6	3.35	4.35	5.35
	$8\frac{1}{2}$	8	4.15	5.15	6.15
	$10\frac{1}{2}$	10	4.95	5.95	6.95
	$12\frac{1}{2}$	12	5.75	6.75	7.75
$2\frac{1}{4}$	$3\frac{1}{2}$	3	2.40	3.40	.....
	$4\frac{1}{2}$	4	2.90	3.90	4.90
	$5\frac{1}{2}$	5	3.50	4.50	5.50
	$6\frac{1}{2}$	6	4.15	5.15	6.15
	$8\frac{1}{2}$	8	5.35	6.35	7.35
	$10\frac{1}{2}$	10	6.50	7.50	8.50
	$12\frac{1}{2}$	12	7.65	8.65	9.65
$3\frac{1}{8}$	$4\frac{1}{2}$	4	3.30	4.30	.....
	$5\frac{1}{2}$	5	3.95	4.95	5.95
	$6\frac{1}{2}$	6	4.65	5.65	6.65
	$8\frac{1}{2}$	8	6.00	7.00	8.00
	$10\frac{1}{2}$	10	7.65	8.65	9.65
	$12\frac{1}{2}$	12	9.00	10.00	11.00
	$14\frac{1}{2}$	14	10.40	11.40	12.40

FLEXIBLE LINK COUPLINGS

For every conceivable form of direct connecting driver to driven member. Permits of variation in alignment, end play and expansion. For direct connecting engines to generators—either alternating or direct current—also to pumps, blowers and fans. Its range of service is enlarging constantly, in fact, it is being applied to all classes of machinery requiring direct connection, meeting with unqualified success. When this Flexible Coupling is used the driver and driven members may be mounted on separate foundations, thereby overcoming the necessity and expense of a common sub-base. No oiling required. Absolutely no attention after installing. It prevents unequal wear of bearings, excessive friction loss, shaft breakage.

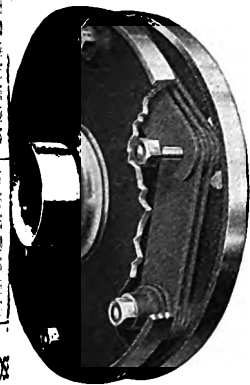


FIG. 1469

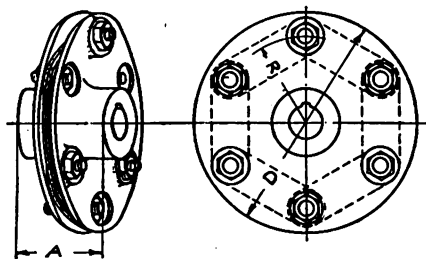


FIG. 1470

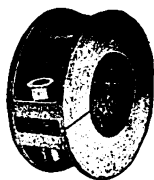
Size Radius R	Max. H.P. at 100 R.P.M.	Maximum		Standard		Outside Dia. D Inches	Standard Net Weight Lbs.	List Price
		Bore Inches	Overall Length-A Inches	Bore Inches	Overall Length-A Inches			
3/4	1/20	3/4	1 3/4	1 1/2	1 3/4	2 1/2	1	\$ 4.80
1 1/8	1/10	3/4	1 3/4	1 5/8	1 3/4	3 1/2	3	8.80
1 3/4	3/4	1	2 5/8	3/4	2 5/8	3 1/2	4	12.00
2	1	1 3/8	4 1/2	1	4 1/8	5 5/8	15	20.00
2 1/2	2	1 7/8	6 3/8	1 3/8	6 3/8	7 1/8	20	24.40
3	3	2 3/8	8 3/8	2	7 3/8	8 1/2	40	31.00
4	6	3	10 3/8	2 3/8	9 3/8	10 3/4	80	36.00
5	8	3 3/4	10 1/8	3	9 1/8	14	120	47.00
6	10	5	11 1/8	3 1/2	11 1/8	16	160	58.00
8	15	5 1/2	13 3/8	4	13 3/8	20	300	82.00
10	30	6 1/2	14 7/8	4 1/2	14 7/8	24	450	127.00
12	50	8	17 1/4	5 1/2	17 1/4	29	650	176.00
14	100	10	21	6 1/2	21	34 1/4	1400	241.00
16	200	12	22 5/8	8	22 5/8	40	2100	288.00

The standard ratings are based on uniformly applied loads such as motor to generator, blowers, centrifugal pumps, line shafts, etc.

Couplings for gas engines, compressors, crushers, fans, etc., having a pulsating load should have a rating from 2 to 4 times the standard.

The bore of flanges often determines the size of coupling.

DODGE SAFETY COLLARS



SPLIT—FIG. 1498

These collars are made solid and split for all sizes of shafting, and comply with all the legal requirements as to safety by having set screws and bolts protected.

Finished and polished on periphery and faced on ends.



SOLID—FIG. 1499

PRICE LIST—SPLIT						PRICE LIST—SOLID					
Shaft Size Inches	List Price	Shaft Size Inches	List Price	Shaft Size Inches	List Price	Shaft Size Inches	List Price	Shaft Size Inches	List Price	Shaft Size Inches	List Price
$1\frac{1}{8}$	\$0.95	$3\frac{1}{8}$	\$ 4.95	$6\frac{1}{8}$	\$15.15	$1\frac{1}{8}$	\$0.65	$3\frac{1}{8}$	\$3.30	$6\frac{1}{8}$	\$10.00
$1\frac{1}{4}$	1.20	$3\frac{1}{4}$	5.40	$6\frac{1}{4}$	16.35	$1\frac{1}{4}$	.80	$3\frac{1}{4}$	3.60	$6\frac{1}{4}$	10.00
$1\frac{3}{8}$	1.50	$4\frac{1}{8}$	6.25	$6\frac{3}{8}$	17.55	$1\frac{3}{8}$	1.00	$4\frac{1}{8}$	4.15	$6\frac{3}{8}$	11.00
$1\frac{1}{2}$	1.80	$4\frac{1}{4}$	7.05	$7\frac{1}{2}$	21.10	$1\frac{1}{2}$	1.20	$4\frac{1}{4}$	4.70	$7\frac{1}{2}$	14.00
$1\frac{5}{8}$	2.10	$4\frac{3}{8}$	7.95	8	24.25	$1\frac{5}{8}$	1.40	$4\frac{3}{8}$	5.30	8	16.00
$2\frac{1}{8}$	2.40	$4\frac{1}{2}$	8.85	$8\frac{1}{2}$	27.65	$2\frac{1}{8}$	1.60	$4\frac{1}{2}$	5.90	$8\frac{1}{2}$	18.00
$2\frac{1}{4}$	2.70	$5\frac{1}{8}$	9.80	9	31.05	$2\frac{1}{4}$	1.80	$5\frac{1}{8}$	6.55	9	20.00
$2\frac{3}{8}$	3.15	$5\frac{1}{4}$	10.80	$9\frac{1}{2}$	34.70	$2\frac{3}{8}$	2.10	$5\frac{1}{4}$	7.20	$9\frac{1}{2}$	23.00
$2\frac{1}{2}$	3.60	$5\frac{3}{8}$	11.85	10	38.65	$2\frac{1}{2}$	2.40	$5\frac{3}{8}$	7.90	10	25.00
$3\frac{1}{8}$	4.05	$5\frac{1}{2}$	12.90	...	....	$3\frac{1}{8}$	2.70	$5\frac{1}{2}$	8.60	...	....
$3\frac{1}{4}$	4.50	$6\frac{1}{8}$	14.05	...	....	$3\frac{1}{4}$	3.00	$6\frac{1}{8}$	9.35	...	....

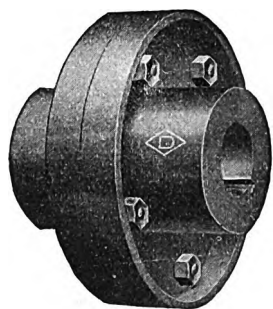


FIG. 1499

DODGE FLANGE COUPLINGS

All of these couplings are designed to meet the most severe conditions of service, and for shafts larger than 6 inches diameter, flange couplings are exclusively employed. The use of flange couplings gives a line shaft in connection with which the very best possible alignment can be secured and maintained.

These couplings are machine finished all over, the bolt holes are reamed and fitted with turn steel coupling bolts, and ends of all bolts are properly protected so that the couplings comply with the legal requirements of all States as to safety.

These couplings, as regularly made and supplied, are of the so-called "plain" type. This is the type which is carried in stock in all standard sizes.

All flange couplings have tapered key-ways, and the necessary tapered keys, properly fitted, are provided.

PRICE LIST OF DODGE FLANGE COUPLINGS

Shaft Size Inches	Price for Couplings with Keys, Not Fitted on Shafts	Price for Key-seating Shafting, Fitting and Facing Coupling on Same	Total Price Fitted to Shaft Complete
$1\frac{1}{8}$	\$ 7.50	\$ 3.75	\$11.25
$1\frac{1}{4}$	8.00	4.00	12.00
$1\frac{1}{2}$	8.50	4.25	12.75
$1\frac{3}{4}$	9.00	4.50	13.50
$2\frac{1}{8}$	10.50	4.75	15.25
$2\frac{1}{4}$	12.50	5.25	17.75
$2\frac{3}{8}$	15.25	5.75	21.00
$2\frac{1}{2}$	18.25	6.25	24.50
$3\frac{1}{8}$	21.75	7.00	28.75
$3\frac{1}{4}$	25.25	7.75	33.00
$3\frac{1}{2}$	29.25	8.50	37.75
$3\frac{3}{4}$	33.25	9.50	42.75
$4\frac{1}{8}$	38.25	10.00	48.25
$4\frac{1}{4}$	43.25	10.50	53.75
$4\frac{3}{8}$	49.00	11.00	60.00
$4\frac{1}{2}$	54.75	11.50	66.25

Reducing Couplings will be charged for at the rate of the larger size shaft of the pair, plus 10 per cent.

Male and female couplings will be charged for at above list prices, plus 10 per cent. This extra applies to the charge for fitting as well as for the couplings proper.

DODGE SOLID SLEEVE COUPLINGS

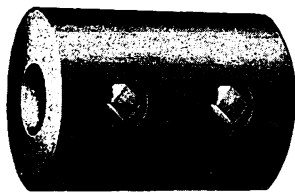


FIG. 1500

These couplings have countersunk set screws and are finished on entire surface.

PRICE LIST

Shaft Size, Inches	List Price	Shaft Size, Inches	List Price
$1\frac{1}{8}$	\$3.00	$1\frac{1}{2}$	\$4.50
$1\frac{1}{4}$	3.50	$1\frac{3}{4}$	5.50
$1\frac{5}{8}$	4.00		

DODGE RIBBED COMPRESSION COUPLINGS

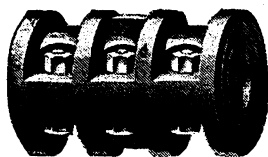


FIG. 1501

This Coupling, which is extensively sold and used, is exceptionally well made, and is adapted for all general line shaft requirements.

All bolt heads and nuts are protected, and the coupling complies with the legal requirements of all states as to safety. The coupling is finished and polished on its periphery and on ends, and has a straight key-way. A square key, properly fitted, is furnished with each coupling.

For shafts larger than $3\frac{1}{4}$, and up to 6 inches, use the "Grimm" type of coupling.

PRICE LIST

Shaft Size, Inches	List Price	Shaft Size, Inches	List Price
$1\frac{1}{8}$	\$3.05	$2\frac{1}{4}$	\$11.00
$1\frac{1}{4}$	4.20	$2\frac{3}{4}$	13.00
$1\frac{1}{2}$	6.30	$3\frac{1}{8}$	16.50
$1\frac{3}{4}$	7.40	$3\frac{1}{2}$	20.00
$2\frac{1}{8}$	9.00	$3\frac{3}{4}$	24.00
$2\frac{1}{4}$	10.00	$3\frac{7}{8}$	28.00

Reducing Couplings will be charged for at the rate of the larger size shaft of the pair, plus 20 per cent.

DODGE COMPRESSION COUPLINGS

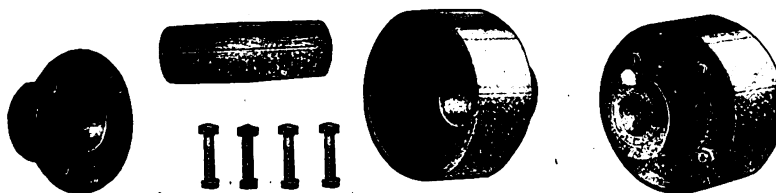


FIG. 1502

PRICE LIST

Shaft Size Inches	List Price	Outside Diameter Inches	Length of Sleeve Inches	Total Length Couplings Inches
$1\frac{1}{8}$	\$ 4.75	$6\frac{1}{2}$	$4\frac{1}{2}$	$4\frac{1}{2}$
$1\frac{1}{4}$	5.50	$6\frac{7}{8}$	5	5
$1\frac{1}{2}$	6.25	$7\frac{1}{4}$	6	6
$1\frac{3}{4}$	8.00	$7\frac{3}{4}$	$7\frac{1}{2}$	$7\frac{1}{2}$
$2\frac{1}{8}$	9.00	$8\frac{1}{4}$	8	8
$2\frac{1}{4}$	10.75	$8\frac{5}{8}$	$8\frac{3}{4}$	$8\frac{3}{4}$
$2\frac{3}{4}$	13.00	9	$9\frac{1}{2}$	$9\frac{1}{2}$
$2\frac{7}{8}$	16.00	$9\frac{3}{4}$	$10\frac{1}{4}$	$10\frac{1}{4}$

It is sometimes a difficult matter to key-seat ends of a shaft for a coupling, either by reason of lack of facilities for properly doing the work, or on account of the fact that one section is already in place and in operation.

The Dodge Compression Coupling was brought out some years ago to meet this particular condition, and it has met with a wonderful success. The coupling grips the shaft by pressure only, and a great driving power is obtained. It is easily erected, and it is very extensively employed in connection with short shafts, and where it is desired to add an additional length or two of shafting to a line of shafting already in place.

It is made in all sizes from $1\frac{1}{8}$ inches up to 6 inches. For shafts larger than $2\frac{1}{4}$ inches the reduced coupling is preferable.

All bolt heads and nuts are protected and the coupling complies with the legal requirements of all states as to safety.

Reducing Couplings will be charged for at the rate of larger size shaft of the pair, plus 20 per cent additional. This applies in cases where the sleeve is bored to fit the two shafts. When reducing thimbles are used to secure the necessary reduction, the cost of the reduction coupling will then be the cost of straight bored coupling for larger shaft size, plus the cost of thimble.

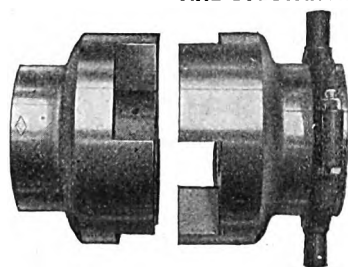
DODGE JAW CLUTCH COUPLINGS

ARE SUBSTANTIALLY DESIGNED FOR GENERAL SERVICE; NECESSARY KEYS ARE FURNISHED

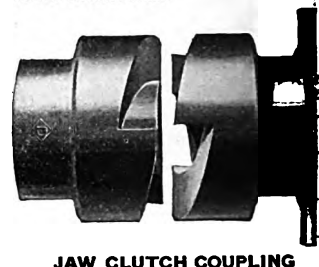
Note—All square Jaw Clutch Couplings up to and including 2½-inch will be furnished with cast jaws unless finished jaws are specified.

In ordering Spiral Jaw Clutch Couplings specify right or left hand.

Prices include the shifter collar, shifter yoke and fulcrum casting, and necessary keys. The shifter lever is not included.



JAW CLUTCH COUPLING
SQUARE—JAWS CAST OR FINISHED
FIG. 1465



JAW CLUTCH COUPLING
SPIRAL—RIGHT OR LEFT HAND
FIG. 1466

DIMENSIONS OF SQUARE AND SPIRAL JAW CLUTCHES

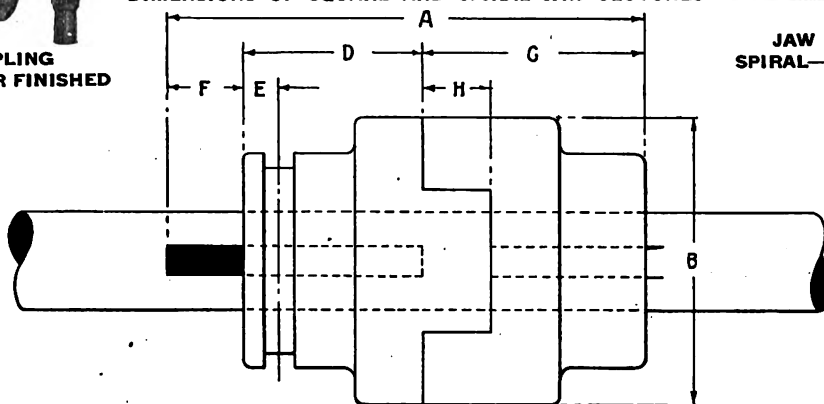


FIG. 1467

APPLYING TO SQUARE JAW CLUTCHES WITH MACHINE FINISHED JAWS ONLY, AND TO ALL SPIRAL JAW CLUTCHES

Shaft Size, Inches	A	B	C	D	E	F	H	Shaft Size, Inches	A	B	C	D	E	F	H
1½	6¾	3¼	3⅞	2½	½	1⅞	⅞	3⅞	14⅞	9⅞	6½	5⅞	1⅞	2¼	1½
1⅞	7⅞	4	3½	2⅞	⅝	1¼	1	3⅞	15⅞	10½	7	6	1⅞	2⅞	2
1⅞	8⅞	4½	3⅞	3⅞	⅝	1⅞	1⅞	4⅞	16⅞	11¼	7⅞	6¼	1⅞	2½	2
1⅞	9⅞	5¼	4⅞	3½	⅞	1½	1½	4⅞	18¼	13	8½	7¼	1⅞	3	2½
1⅞	9⅞	5⅞	4½	3¼	⅞	1½	1½	5⅞	20¼	14¼	9¼	7¼	1⅞	3¼	2½
2⅞	10½	6½	4⅞	3⅞	¾	1¾	1¾	6	22	16⅞	10	8½	1⅞	3½	3
2⅞	11⅞	7	5¼	4½	¾	1⅞	1½	6½	23¼	17¼	10¼	9¼	1⅞	3¾	3
2⅞	12⅞	7¾	5½	4⅞	⅞	1⅞	1½	7	25½	18¼	11¼	9¾	1⅞	4	3½
2⅞	12⅞	8⅞	5⅞	4⅞	⅞	2¼	1¾								

PRICE LIST OF JAW CLUTCH COUPLINGS

Shaft Sizes, Inches	SQUARE		Spiral Cast Jaws	LEVER		Char for Fitting to Sh
	Finished Jaws	Cast Jaws		Standard Length	Price	
1½	\$ 19.45	\$10.00	\$10.00	4' 0"	\$2.00	\$ 3.00
1⅞	23.20	11.95	11.95	4' 0"	2.00	4.00
1⅞	26.85	13.80	13.80	4' 0"	2.00	4.00
1⅞	29.70	15.25	15.25	4' 6"	2.15	4.00
2⅞	33.75	17.40	17.40	4' 6"	2.15	4.00
2⅞	37.10	19.05	19.05	4' 6"	2.15	4.00
2⅞	41.35	21.25	21.25	4' 6"	2.15	4.00
2⅞	49.20	25.15	25.15	4' 6"	2.15	5.00
3⅞	52.20	.....	30.00	4' 6"	2.45	7.00
3⅞	68.10	.....	39.00	5' 0"	2.95	9.00
4⅞	92.00	.....	.....	5' 0"	2.95	13.00
4⅞	116.25	.....	.....	5' 6"	3.20	17.00
5⅞	133.75	.....	.....	5' 6"	3.20	20.00
6	149.25	.....	.....	6' 0"	3.45	25.00
6½	173.50	.....	.....	6' 0"	3.45	25.00
7	212.50	.....	.....	6' 6"	3.60	25.00
7½	233.50	.....	.....	6' 6"	3.60	25.00
8	255.50	.....	.....	7' 0"	3.90	25.00

APPLYING TO SQUARE JAW CLUTCHES WITH CAST JAWS ONLY

Shaft Size, Inches	A	B	C	D	E	F	H
1½ to 1¼	5½	3⅞	3⅞	2½	½	1	¾
1⅞ to 1½	6¼	4	3⅞	2⅞	⅝	1⅞	⅞
1⅞ to 1¾	6⅞	4⅞	3⅞	3⅞	⅞	1¼	1
1⅞ to 2	7⅞	5¼	4⅞	3⅞	⅞	1¼	1
2⅞ to 2¼	8	5⅞	4⅞	3⅞	¾	1⅞	1¼
2⅞ to 2½	8⅞	6½	4¾	3⅞	¾	1⅞	1¼
2⅞ to 2¾	9¼	7	5⅞	4⅞	¾	1⅞	1¼
2⅞ to 3	9⅞	7⅞	5⅞	4⅞	¾	1¾	1½

Internal collars are furnished with square jaw clutches having machine finished jaws only.

DODGE JAW CLUTCHES, WITH CAST JAWS, APPLIED TO HUBS OF PULLEYS, SPROCKETS AND GEARS

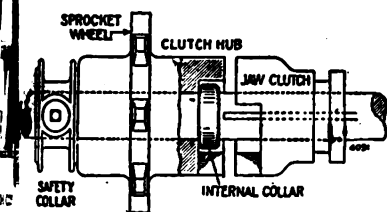


FIG. 1467 1/2

PRICE LIST, COVERING NECESSARY ADDITION TO PRICE OF PULLEY, SPROCKET OR GEAR WITH WHICH CLUTCH IS USED

Shaft Size, Inches	Price, Square Jaw or Spiral	Shaft Size, Inches	Price, Square Jaw or Spiral
1 1/8	\$12.00	2 1/8	\$20.90
1 1/4	14.35	2 1/4	22.85
1 1/2	16.55	2 3/4	25.50
1 5/8	18.30	2 7/8	30.20

Price includes:

1.—Sliding half, with necessary shifter collar and grease cup on same, and the shifter yoke and fulcrum casting. The lever is not included.

2.—Matching half cast on hub of wheel, with hub faced on one end to run against the internal collar, and faced on other end to run against the safety collar; drilling oil hole through hub of wheel; and the internal collar. The safety collar is extra and is not included.

DODGE JAW CLUTCHES WITH SLEEVES FOR PULLEYS, SPROCKETS AND GEARS

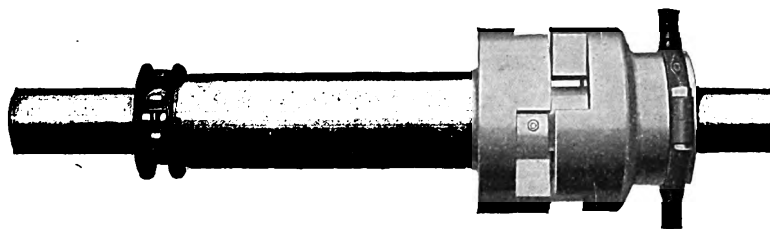


FIG. 1468

PRICE LIST

Shaft Size Inches	Dimensions of Sleeve					Price			
	Out- side Diam.	Key- way Out- side	Length of Sleeve	Total Space on Shaft for Clutch with Standard Sleeve		Square		Spiral Cast Jaws	Extra for Each Additional Inch in Length of Sleeve
				Cast Jaw Square	Sq. Planed & Spiral Cast	Planed Jaws	Cast Jaws		
1 1/8	2 1/8	5/8 x 1/4	5	9 1/4	9 7/8	\$25.00	\$15.00	\$15.00	\$1.00
1 1/4	2 1/4	5/8 x 1/4	6	10 7/8	11 1/8	30.00	17.00	17.00	1.10
1 1/2	2 1/2	3/4 x 1/4	7	12 3/8	12 5/8	34.00	20.00	20.00	1.20
1 5/8	2 3/4	3/4 x 1/4	8	13 5/8	14 1/4	40.00	23.00	23.00	1.30
2 1/8	3 1/8	7/8 x 1/4	9	15 1/4	15 7/8	46.00	25.00	25.00	1.40
2 1/4	3 1/4	1 x 1/4	10	16 7/8	17 1/4	50.00	30.00	30.00	1.50
2 1/2	4 1/8	1 1/8 x 1/4	11	18 1/4	18 3/8	56.00	35.00	35.00	1.60
2 3/4	4 1/4	1 1/8 x 1/4	12	19 3/8	20 3/8	66.00	40.00	40.00	1.70
3 1/8	4 3/4	1 1/4 x 1/4	14	.....	23 3/8	72.00	.....	.....	2.00
3 1/4	5 1/8	1 3/8 x 1/4	16	.....	26 3/8	85.00	.....	.....	2.50

PRICE INCLUDES

1.—Sliding half, with necessary shifter collar, and the shifter yoke and fulcrum casting. The lever is not included.

2.—Sleeve, with jaw cast on, with necessary internal collar, and with oil hole drilled and tapped approximately at center of sleeve and fitted with oil pipe. Grease cups on sleeve will not be furnished unless specifically called for, and they will be charged for extra.

The safety collar at end of sleeve is not included in above price, or in dimension for space on shaft.

Sleeve length should not be less than face of pulley used.

DODGE SOLID FRICTION CLUTCHES

PARTICULARLY ADAPTED FOR COUNTERSHAFT USE

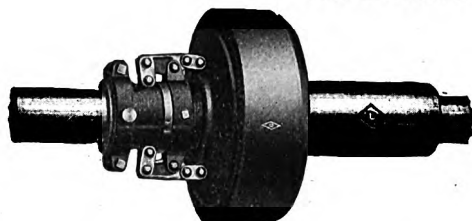


FIG. 1457

The Dodge Solid Friction Clutch is particularly adapted for countershaft use, and such other places where a solid type of clutch can be advantageously employed, and where the power requirements are within the range of capacities offered in this style of construction.

The clutch is a neat and self-contained device, embracing a system of multiple friction discs, which gives an extremely powerful clutch for its size. In the 4, 5 and 6-inch sizes, these

friction surfaces are iron on iron; in all other sizes, the rings contain wooden friction blocks.

While regularly made to operate at the maximum speeds below, this clutch, by special attention to certain details of manufacture, can be made to successfully operate at speeds much in excess of those mentioned, for which work an extra charge will apply.

The cut above clearly shows the simplicity of construction which obtains in this clutch.

Any kind of a pulley—wood, iron center wood rim or iron, and either solid or split—or any gear, sprocket or sheave wheel, can be used upon this clutch.

On account of the fact that these clutches in Standard bore, are carried in stock by us, for immediate delivery, it is generally advisable, so far as possible, to use upon the clutch, the Dodge Wood Split Pulleys, or the Dodge Standard Iron Split Pulleys, which are likewise both stock articles, and in that way, the clutch and pulley complete can be secured at once, ready for service.

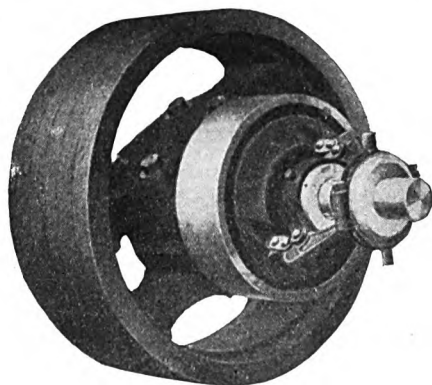


FIG. 1457 1/2

CLUTCH WITH WOOD SPLIT PULLEY ON SLEEVE

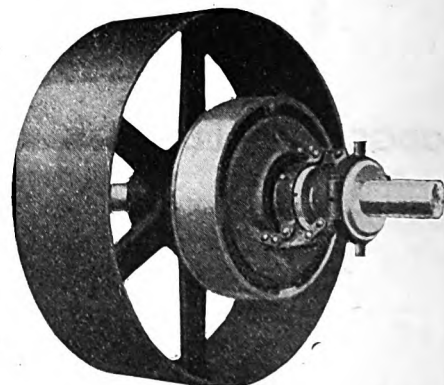


FIG. 1458 1/2

CLUTCH WITH SOLID IRON PULLEY ON SLEEVE

RATED CAPACITIES OF DODGE SOLID FRICTION CLUTCHES WHEN OPERATING AT SPEEDS SHOWN

Size of Clutch Inches	Revolutions Per Minute									Maximum Speed	Maximum Bore	
	100	150	200	250	300	350	400	450	500		Inches Reg.	Inches Spec.
	H. P.	H. P.	H. P.	H. P.	H. P.	H. P.	H. P.	H. P.	H. P.			
4	1 1/4	1 1/8	2 1/2	3 1/8	3 1/4	4	4 1/2	5	5 1/2	600	1 1/4	.
5	2	3	4	5	5 3/4	6 1/2	7	8	9	580	1 1/2	.
6	3	4	6	7	8 1/2	9	10	11	12	560	1 3/4	.
7	4	6	8	10	11	12	13	15	16	540	2	.
8	5	7	10	12	14	15	17	18	19	520	2 1/4	.
9	6	9	12	15	17	19	20	22	23	500	2 1/2	.
10	10	15	20	25	28	31	36	39	40	480	3	.
12	15	22	30	37	43	47	51	59	....	440	3	4
14	30	45	60	75	85	95	102	..	....	400	3 1/2	5
16	50	75	100	125	142	157	170	..	...	360	4 1/2	6

The maximum speeds above mentioned are the highest speeds at which the various clutches, as ordinarily and regularly made, should be operated. They can be made, however, so as to successfully operate at still higher speeds by special attention to certain features of their manufacture, for which work an extra charge will apply.

The ratings above given are conservatively stated; but it must not be overlooked that they are based upon the carrying

capacity of the clutch when the load has been gotten up to speed. Frequently a much greater power is required to pick up a lot from its condition of rest, and get it up to speed, than is required later to keep it going. Up to 250 revolutions per minute it can be considered that the horsepower capacity of a clutch increases in direct ratio to the speed. Above 250 revolutions per minute, account of the increased difficulty in picking up the load, it is necessary to decrease the rating to some extent, as shown above table.

DODGE SOLID FRICTION CLUTCHES**SUGGESTED SIZES**

To be used with different sizes of Pulleys when speed does not exceed 250 revolutions per minute.

(Subject to Exceptions Opposite).

NOTE: Pulleys with faces to the left of the back dividing line can be used on clutches with standard length sleeves as shown below. Pulleys with faces to the right of the back dividing line will require a longer sleeve than standard on the clutch, as shown below. These longer sleeves can be furnished when required, but an extra charge will be made as per list on page 394.

EXCEPTIONS

(1) If shaft size is larger than clutch will bore, use size of clutch that will bore out for required shaft.

(2) In all cases where a clutch pulley is driven from a single cylinder gas engine, use a clutch at least 100 per cent larger than listed. Gas engine service is very severe.

(3) In all cases where the initial starting load is heavy or where the load is of a fluctuating nature, and subject to shocks, use a clutch of 100 per cent larger capacity.

(4) Where speeds are high, use a clutch from 25 to 100 per cent larger so clutch can pick up load easily and in a short space of time, so that there will be no undue wear on the friction blocks and plates.

The capacities of the pulleys in table have been figured upon the basis of a working belt tension of 60 lbs. per inch of width of belt. If a higher belt tension is used, a larger clutch than shown in table will be necessary.

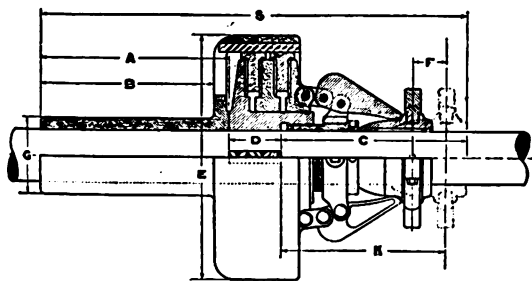
DIMENSIONS OF DODGE SOLID FRICTION CLUTCHES

FIG. 1458

Dimension "A" is the total over-all length of sleeve on shaft for standard clutches as regularly made. This dimension can be made longer or shorter, but on special order only. When sleeves are made longer or shorter than standard, proper correction of total space "S" on shaft should be made. Table below shows standard length regularly furnished unless otherwise specified.

Dimension "B" is the total available length of sleeve of standard clutches for carrying pulley, gear, sheave or sprocket. The width of face, or the length of the hub of pulley, etc., should not exceed this dimension "B".

All standard sleeves are tapped in the center and an oil pipe 2½ inches or 3 inches long, with a cap on end, is regularly furnished on each sleeve.

Special patterns of 12 inch, 14 inch, and 16 inch clutches are provided to accommodate bores as shown in third column of table.

Clutches 9 inches and smaller have the taper sliding collar as shown; sizes 10 inches and longer have toggle mechanism except when operated in duplex.

Size of Clutch	Largest Shaft		A	B	C	D	E	F	G	K	S
	Reg.	Spec.									
4	1¼	..	4½	4	4¾	1½	5¾	¾	For Diameter of Sleeve G See Page 424	4¾	10¾
5	1½	..	5	4½	4¾	1¾	6½	¾		4¾	11½
6	1¾	..	6	5½	6¾	1¾	7¼	1¼		5¾	14¼
7	2	..	7	6¼	6¾	2¾	8¾	1¼		6¾	14¼
8	2¼	..	8	7¼	7½	2¾	10½	1½		7	17¾
9	2½	..	10	9¼	7¾	2¾	11¾	1½		7	20
10	3	..	11	10¼	7½	2¾	12½	1		6¾	21
12	3	4	12	11	8½	2¾	15½	1¼		7¾	23¼
14	3½	5	13	12	9	3	17½	1¼		8½	25
16	4½	6	14	13	9¾	4¾	19½	1½		9	28

DODGE SOLID FRICTION CLUTCHES

STANDARD OUTSIDE DIAMETERS AND KEYSEATS FOR EXTENSION SLEEVES

CAST IRON BORED AND REAMED SLEEVES

PLAIN BRONZE BUSHED SLEEVES

Shaft Sizes, Inches	Sleeve Diameter, Inches	Keyseat, Inches	Shaft Sizes, Inches	Sleeve Diameter, Inches	Keyseat, Inches
$\frac{1\frac{1}{8}}{16}$ to $1\frac{1}{2}$	$2\frac{7}{16}$	$\frac{5}{8} \times \frac{3}{8}$	$\frac{1\frac{1}{8}}{16}$ to $1\frac{1}{2}$	$2\frac{7}{16}$	$\frac{5}{8} \times \frac{3}{8}$
$\frac{1\frac{1}{8}}{16}$ to 2	$2\frac{1}{2}$	$\frac{3}{4} \times \frac{1}{4}$	$\frac{1\frac{1}{8}}{16}$ to $1\frac{3}{4}$	$2\frac{1}{2}$	$\frac{3}{4} \times \frac{1}{4}$
$\frac{2\frac{1}{8}}{16}$ to $2\frac{1}{4}$	$3\frac{1}{16}$	$\frac{7}{8} \times \frac{1}{4}$	$\frac{1\frac{1}{8}}{16}$ to 2	$3\frac{1}{16}$	$\frac{7}{8} \times \frac{1}{4}$
$\frac{2\frac{1}{8}}{16}$ to $2\frac{1}{2}$	$3\frac{1}{8}$	1 $\times \frac{1}{4}$	$\frac{2\frac{1}{8}}{16}$ to $2\frac{1}{4}$	$3\frac{1}{8}$	1 $\times \frac{1}{4}$
$\frac{2\frac{1}{8}}{16}$ to 3	$4\frac{1}{16}$	$1\frac{1}{8} \times \frac{1}{4}$	$\frac{2\frac{1}{8}}{16}$ to $2\frac{3}{4}$	$4\frac{1}{16}$	$1\frac{1}{8} \times \frac{1}{4}$
$\frac{3\frac{1}{8}}{16}$ to $3\frac{1}{2}$	$4\frac{1}{8}$	$1\frac{1}{4} \times \frac{1}{4}$	$\frac{2\frac{1}{8}}{16}$ to $3\frac{1}{4}$	$4\frac{1}{8}$	$1\frac{1}{4} \times \frac{1}{4}$
$\frac{3\frac{1}{8}}{16}$ to 4	$5\frac{1}{16}$	$1\frac{3}{8} \times \frac{1}{4}$	$\frac{3\frac{1}{8}}{16}$ to $3\frac{3}{4}$	$5\frac{1}{16}$	$1\frac{3}{8} \times \frac{1}{4}$
$\frac{4\frac{1}{8}}{16}$ to $4\frac{1}{2}$	$5\frac{1}{8}$	$1\frac{1}{2} \times \frac{1}{4}$	$\frac{3\frac{1}{8}}{16}$ to $4\frac{1}{4}$	$5\frac{1}{8}$	$1\frac{1}{2} \times \frac{1}{4}$
$\frac{4\frac{1}{8}}{16}$ to 5	$6\frac{1}{2}$	$1\frac{3}{4} \times \frac{1}{4}$	$\frac{4\frac{1}{8}}{16}$ to $4\frac{3}{4}$	$6\frac{1}{2}$	$1\frac{3}{4} \times \frac{1}{4}$
$\frac{5\frac{1}{8}}{16}$ to $5\frac{1}{2}$	7	$1\frac{3}{4} \times \frac{1}{4}$	$\frac{4\frac{1}{8}}{16}$ to $5\frac{1}{4}$	7	$1\frac{3}{4} \times \frac{1}{4}$
$\frac{5\frac{1}{8}}{16}$ to 6	$7\frac{1}{2}$	2 $\times \frac{1}{4}$	$\frac{5\frac{1}{8}}{16}$ to $5\frac{3}{4}$	$7\frac{1}{2}$	2 $\times \frac{1}{4}$
.....	...	.....	$\frac{5\frac{1}{8}}{16}$ to 6	8	2 $\times \frac{3}{8}$

CAPILLARY OILING BRONZE BUSHED SLEEVES

Shaft Sizes, Inches	Sleeve Diameter, Inches	Keyseat, Inches	Shaft Sizes, Inches	Sleeve Diameter, Inches	Keyseat, Inches	Shaft Sizes, Inches	Sleeve Diameter, Inches	Keyseat, Inches
$\frac{1\frac{1}{8}}{16}$ to $1\frac{1}{4}$	$2\frac{1}{8}$	$\frac{3}{4} \times \frac{3}{8}$	$\frac{2\frac{1}{8}}{16}$ to $2\frac{3}{4}$	$4\frac{1}{8}$	$1\frac{1}{4} \times \frac{1}{4}$	$\frac{4\frac{1}{8}}{16}$ to $4\frac{3}{4}$	7	$1\frac{3}{4} \times \frac{1}{4}$
$\frac{1\frac{1}{8}}{16}$ to $1\frac{3}{4}$	$3\frac{1}{16}$	$\frac{7}{8} \times \frac{1}{4}$	$\frac{2\frac{1}{8}}{16}$ to $3\frac{1}{4}$	$5\frac{1}{16}$	$1\frac{3}{8} \times \frac{1}{4}$	$\frac{4\frac{1}{8}}{16}$ to $5\frac{1}{4}$	$7\frac{1}{2}$	2 $\times \frac{1}{4}$
$\frac{1\frac{1}{8}}{16}$ to 2	$3\frac{1}{8}$	1 $\times \frac{1}{4}$	$\frac{3\frac{1}{8}}{16}$ to $3\frac{3}{4}$	$5\frac{1}{8}$	$1\frac{1}{2} \times \frac{1}{4}$	$\frac{5\frac{1}{8}}{16}$ to $5\frac{3}{4}$	8	2 $\times \frac{3}{8}$
$\frac{2\frac{1}{8}}{16}$ to $2\frac{1}{4}$	$4\frac{1}{16}$	$1\frac{1}{8} \times \frac{1}{4}$	$\frac{3\frac{1}{8}}{16}$ to $4\frac{1}{4}$	$6\frac{1}{2}$	$1\frac{3}{4} \times \frac{1}{4}$	$\frac{5\frac{1}{8}}{16}$ to 6	$8\frac{1}{2}$	$2\frac{1}{4} \times \frac{3}{8}$

NOTE: For lengths of sleeves, see page 423. For clutches 4 to 9 inches, inclusive, sleeves are not keyseated. Clutch 10 to 16 inches, inclusive, have keyseats in sleeves.

PRICE LIST OF DODGE SOLID FRICTION CLUTCHES

Size of Clutch, Inches	H. P. at 100 R. P. M.	Largest Bore Possible	Length of Standard Sleeve	Maximum Pulley Face Allowable on St'd'd Sleeve	Speed*	PRICE					
						Clutch with Standard Length Iron Sleeve	Additional Length of Sleeve Per Inch	Clutch with Standard Length Bronze Bushed Sleeve	Additional Length of Bronze Bushed Sleeve Per Inch	Clutch with Standard Length Capillary Oil-Bushed Sleeve	Additional Length of Capillary Oiling Bronze Bushed Sleeve Per Inch
4	1¼	1¼	4½	4	600	\$ 15.00	\$1.00	\$ 18.00	\$1.75	\$ 22.00	\$2.50
5	2	1½	5	4½	580	17.00	1.10	21.00	1.90	25.00	2.70
6	3	1¾	6	5½	560	20.00	1.20	24.50	2.00	29.00	2.90
7	4	2	7	6¼	540	22.00	1.30	27.00	2.10	31.00	3.10
8	5	2¼	8	7¼	520	27.00	1.40	35.00	2.40	40.00	3.30
9	6	2½	10	9¼	500	30.00	1.50	39.00	2.50	45.00	3.50
10	10	3	11	10¾	480	37.00	1.60	47.00	2.60	54.00	3.70
12	15	3	12	11	440	45.00	1.70	57.00	2.70	65.00	3.90
12 Spl.	15	4	12	11	440	55.00	2.50	70.00	3.75	80.00	4.75
14	30	3½	13	12	400	65.00	2.00	80.00	3.25	90.00	4.25
14 Spl.	30	5	13	12	400	75.00	3.00	90.00	4.25	100.00	5.25
16	50	4½	14	13	360	100.00	2.25	120.00	3.25	132.00	4.25
16 Spl.	50	6	14	13	360	115.00	3.25	135.00	4.50	150.00	5.50

*Speeds shown above are for clutches as regularly built for ordinary factory requirements. When desired for higher speed than shown above, prices will be quoted upon request accompanied by full information.

For capacity ratings at other speeds than 100 R. P. M., see Page 422.

DODGE SOLID FRICTION CLUTCH CUT-OFF COUPLINGS

SUGGESTED MINIMUM SIZES

TO BE USED WITH DIFFERENT SIZES OF SHAFTS

Subject to Exceptions Below:

Shaft Size Inches	Size of Coupling	Shaft Size Inches	Size of Coupling
1	4	2 $\frac{3}{8}$	12
1 $\frac{1}{8}$	5	2 $\frac{1}{2}$	14
1 $\frac{1}{4}$	7	2 $\frac{1}{2}$	14
1 $\frac{3}{8}$	9	2 $\frac{1}{2}$	16
1 $\frac{1}{2}$	10		

EXCEPTIONS

(1) In all cases where a cut-off coupling is used in connection with a single cylinder gas or gasoline engine, use a coupling not less than 100% larger than listed above. Gas engine service is very severe.

(2) In all cases where the initial starting load is heavy, or where the load is of a variable nature and subject to shocks, use a coupling 100% larger.

(3) Where speeds are high, use a coupling 25% to 100% larger, so it can pick up load easily and in a short space of time, so that there will be no undue wear on the friction blocks and plate.

NOTE: The above table of suggested sizes is based upon using a coupling of the same rated capacity as the ordinary rated capacity of the various sizes of shafts shown. Using a coupling of smaller capacity than the capacity of the shaft is bad practice.

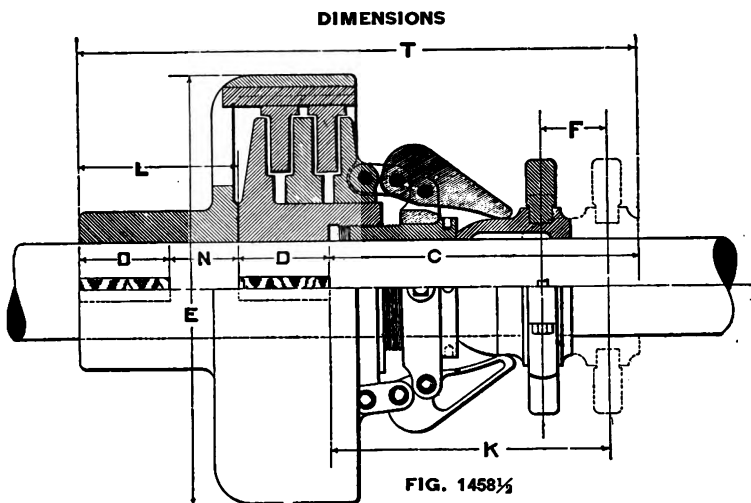


FIG. 1458½

Size of Clutch	Largest Shaft	C	D	E	F	K	L	N	T
4	1 $\frac{1}{4}$	4 $\frac{3}{4}$	1 $\frac{1}{2}$	5 $\frac{3}{8}$	3 $\frac{1}{4}$	4 $\frac{3}{8}$	2 $\frac{3}{4}$	1 $\frac{1}{4}$	9
5	1 $\frac{1}{2}$	4 $\frac{3}{4}$	1 $\frac{3}{4}$	6 $\frac{1}{2}$	3 $\frac{1}{4}$	4 $\frac{3}{8}$	3 $\frac{1}{8}$	1 $\frac{3}{8}$	9 $\frac{5}{8}$
6	1 $\frac{3}{4}$	6 $\frac{3}{8}$	1 $\frac{7}{8}$	7 $\frac{1}{4}$	1 $\frac{1}{4}$	5 $\frac{7}{8}$	3 $\frac{3}{8}$	1 $\frac{1}{2}$	11 $\frac{5}{8}$
7	2	6 $\frac{7}{8}$	2 $\frac{1}{8}$	8 $\frac{7}{8}$	1 $\frac{1}{4}$	6 $\frac{3}{8}$	3 $\frac{3}{4}$	1 $\frac{5}{8}$	12 $\frac{3}{4}$
8	2 $\frac{1}{4}$	7 $\frac{1}{2}$	2 $\frac{1}{4}$	10 $\frac{1}{8}$	1 $\frac{1}{2}$	7	4	1 $\frac{3}{4}$	13 $\frac{3}{4}$
9	2 $\frac{1}{2}$	7 $\frac{5}{8}$	2 $\frac{3}{8}$	11 $\frac{3}{8}$	1 $\frac{1}{2}$	7	4 $\frac{1}{4}$	1 $\frac{7}{8}$	14 $\frac{1}{4}$
10	3	7 $\frac{1}{2}$	2 $\frac{1}{2}$	12 $\frac{5}{8}$	1	6 $\frac{7}{8}$	4 $\frac{1}{2}$	2	14 $\frac{1}{2}$
12	4	8 $\frac{1}{2}$	2 $\frac{3}{4}$	15 $\frac{1}{8}$	1 $\frac{1}{4}$	7 $\frac{3}{4}$	5	2 $\frac{1}{4}$	16 $\frac{1}{4}$
14	5	9	3	17 $\frac{5}{8}$	1 $\frac{1}{4}$	8 $\frac{1}{8}$	5 $\frac{1}{2}$	2 $\frac{1}{2}$	17 $\frac{1}{2}$
16	6	9 $\frac{7}{8}$	4 $\frac{1}{8}$	19 $\frac{1}{2}$	1 $\frac{1}{2}$	9	5 $\frac{7}{8}$	2 $\frac{3}{4}$	20 $\frac{7}{8}$

Clutches 9 inches and smaller have the taper sliding collar as shown; sizes 10 inches and larger have toggle mechanism.

PRICE LIST CUT-OFF COUPLINGS

LEVERS ONLY

Size of Coupling	Largest Bore Possible	H.P. at 100 R.P.M.	*Speed	**Price	Standard Length		Price	Price Each Additional Foot
					Ft.	Ins.		
4	1 $\frac{1}{4}$	1 $\frac{1}{4}$	600	\$15.00	3	0	\$1.75	\$.15
5	1 $\frac{1}{2}$	2	580	17.00	3	0	1.75	.15
6	1 $\frac{3}{4}$	3	560	20.00	3	0	1.75	.15
7	2	4	540	22.00	3	6	1.85	.15
8	2 $\frac{1}{4}$	5	520	27.00	3	6	1.85	.15
9	2 $\frac{1}{2}$	6	500	30.00	3	6	1.85	.15
10	3	10	480	37.00	4	0	2.00	.20
12	3	15	440	45.00	4	0	2.00	.20
14	3 $\frac{1}{2}$	30	400	65.00	4	6	2.15	.20
16	4 $\frac{1}{2}$	50	360	100.00	4	6	2.15	.20

*Speeds shown above are for Clutches as regularly built for ordinary factory requirements. When desired for higher speeds than shown above, prices will be quoted on application.

For Capacity ratings at other speeds than 100 R.P.M., see page 422.

**When one shaft is smaller than the other, requiring a reducing cut-off coupling, an additional charge of 10% will be made.

DODGE PATENT SPLIT FRICTION CLUTCHES

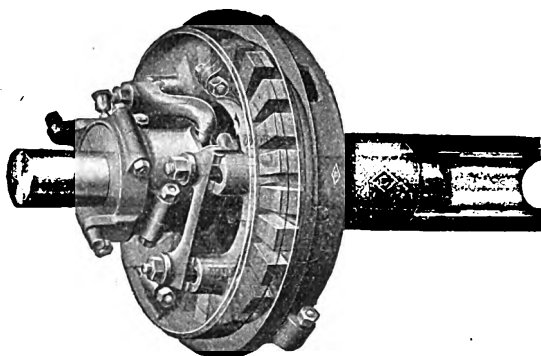


FIG. 1459

The split feature of these clutches is a most valuable one, and makes possible two things of great importance and value:

(1) The easy and ready installation of the equipment upon a shaft already in place without taking down the shaft or disturbing any of the equipment upon same, and

(2) The greatest possible facility in the taking off of old parts and the substitution of new, in the event that any repairs or renewals are necessary.

In connection with all of the Dodge larger clutches, this split type is used exclusively because of the advantages above mentioned.

An important feature of the Dodge Split Clutch is its great friction power, same being obtained through an outside disc into which are driven hard maple blocks presenting end grain, an inside driving plate which is keyed to the shaft, and an outside driving plate attached to inside driving plate and levers. By a movement of levers, the driving plates are brought in contact with the wooden blocks, thus transmitting the power to sleeve.

Any kind of a pulley, sheave, gear or sprocket can be mounted upon the sleeve of these clutches. The extensive use of jigs and templates in connection with the manufacture of all the various parts of these clutches insures their absolute interchangeability and perfect fit.

DODGE PATENT SPLIT FRICTION CLUTCHES—HORSE POWER CAPACITIES

Size of Clutch Inches	REVOLUTIONS PER MINUTE										
	100	150	200	250	300	350	400	450	500	550	600
10	6	9	12	15	18	20	22	23	24	25	26
12	10	15	20	25	30	33	36	38	40	41	42
14	15	22	30	37	45	50	54	57	60	62	63
16	20	30	40	50	57	63	68	72	75	77	78
18	25	37	50	62	71	80	85	90	94	96	98
20	32	48	64	82	91	101	109	115	120	123	125
22	40	60	80	95	108	119	128	135	140	143	...
24	50	75	100	119	135	148	160	169	175	...	...
28	80	120	160	190	216	238	256	270	...	...	...
30	100	150	200	238	270	297	320	...	...	...	...
36	130	195	247	293	332	365	390	...	...	...	...
42	175	262	333	394	457	490	...	...	...	...	...
48	240	360	456	540	612	...	...	...	...	...	...
54	340	510	646	765	867	...	...	...	...	...	...
60	500	750	950	1125	...	...	...	...	...	...	...
72	1000	1500	...	...	...	...	...	...	...	...	...

MAXIMUM ALLOWABLE SPEEDS OF SPLIT CLUTCHES AS REGULARLY MADE

There are two conditions which have an influence upon the speed at which clutches can be successfully operated. The conditions are:

- (1) The kind of sleeve used.
- (2) The degree of accuracy in balancing the mechanism.

Clutches as regularly made are balanced for the usual trade necessities, and it is upon this basis that the lists and discounts apply. Clutches can be made to run faster than the speeds indicated below when it is necessary, but only by giving special attention to the balancing and other similar features of construction; and for this work an extra charge is made.

REVOLUTIONS PER MINUTE

Kind of Sleeve	Size of Clutch, Inches														
	10	12	14	16	18	20	22	24	28	30	36	42	48	54	60
Cast Iron.....	250	250	250	250	250	250	250	250	...	...	...	...	...	...	...
Babbitted.....	450	440	430	420	410	400	390	380	360	350	...	...	...	...	...
Capillary Oiling Bronze Bushed....	450	440	430	420	410	400	390	380	360	350	...	...	...	...	...
Loose Bronze Bushed.....	450	440	430	420	410	400	390	380	360	350	325	300	275	250	225
Quills.....	...	...	...	...	...	...	...	380	360	350	325	300	275	250	225

DODGE PATENT SPLIT FRICTION CLUTCHES

SUGGESTED SIZES OF DODGE SPLIT CLUTCHES TO BE USED WITH DIFFERENT SIZES OF PULLEYS

WHEN SPEEDS DO NOT EXCEED 250 REVOLUTIONS PER MINUTE
(SUBJECT TO EXCEPTIONS BELOW)

EXCEPTIONS

(1) If shaft size is larger than clutch will bore, use size of clutch that will bore out for required shaft.

(2) In all cases where a clutch pulley is driven from a single cylinder gas engine, use a clutch having 100% greater capacity than listed above. Gas engine service is very severe.

(3) In all cases where the initial starting load is heavy, or where there is a violently fluctuating load, use a clutch of 100% greater capacity. Do not forget that some machines require much more power to start them than to operate them after they are up to speed.

(4) Where speeds are high, use a clutch of 25% to 100% greater capacity, so clutch can pick up load easily and in a short space of time so that there will be no undue wear on the friction blocks and plates.

(5) The capacities of the pulleys in above table have been figured upon the basis of a working tension of 60 lbs. per inch of width of belt. If a higher belt tension is used, a larger clutch than shown in table will be necessary.

NOTE:—Any kind of a pulley can be used, so long as it is properly bored to go over the clutch sleeve. However, on split clutches, we suggest the advisability of always using split pulleys. With pulleys of sizes to the left of black line in above table, cast iron sleeves can be used if speeds do not exceed 250 R. P. M. With pulleys of sizes to the right of black line and below it, we recommend the use of babbitted sleeves in most cases, and loose bronze bushed or self-oiling bronze bushed sleeves in special cases.

Diam. of Pulleys	FACES OF PULLEYS								
	4	6	8	10	12	14	16	18	20
	Clutch	Clutch	Clutch	Clutch	Clutch	Clutch	Clutch	Clutch	Clutch
6	10	10	10	..	..	..	..	..	..
7	10	10	10	..	..	..	..	..	..
8	10	10	10	10	..	..	..	..	..
9	10	10	10	10	..	..	..	..	..
10	10	10	10	10	10	12	..	..	..
12	10	10	10	10	12	12	..	..	..
14	10	10	10	12	12	12	..	..	..
16	10	10	12	12	12	14	..	..	..
18	10	10	12	12	14	14	14	..	..
20	10	10	12	12	14	14	16	16	16
22	10	12	12	14	14	14	16	16	18
24	10	12	12	14	14	16	16	18	18
26	10	12	12	14	14	16	18	18	20
28	10	12	14	14	16	16	18	18	20
30	10	12	14	14	16	18	18	20	20
32	12	12	14	16	16	18	18	20	20
34	12	12	14	16	16	18	20	20	22
36	12	14	14	16	18	18	20	20	22
38	12	14	14	16	18	20	20	22	22
40	12	14	16	16	18	20	20	22	22
42	12	14	16	18	18	20	22	22	24
44	12	14	16	18	20	20	22	22	24
46	12	14	16	18	20	20	22	24	24
48	12	14	16	18	20	22	22	24	24
50	12	14	16	18	20	22	22	24	24
52	14	16	18	20	20	22	24	24	28
54	14	16	18	20	20	22	24	24	28
56	14	16	18	20	22	22	24	24	28
58	14	16	18	20	22	22	24	28	28
60	14	16	18	20	22	24	24	28	28
66	14	16	20	22	22	24	28	28	28
72	14	18	20	22	24	24	28	28	28

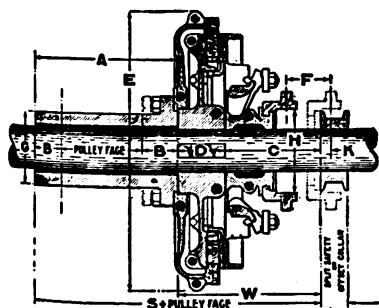


FIG. 1460

DIMENSIONS

Clutch Sizes	A	B	C	D	E	F	G	H	K	S	W
10	Pulley face + 2B = total length of sleeve	2 1/2	6 7/8	3 3/4	14	2 1/4	For outside diameter of sleeves see page 428	4 1/2	1	15 5/8	10 5/8
12		2 1/2	7 1/8	3 3/4	17	2 5/8		4 1/2	1 3/4	16 1/8	11 1/8
14		2 1/2	8 1/4	4 1/4	19	3		5 7/8	1 3/4	17 3/4	12 3/4
16		3	8 3/4	4 1/4	21	3		6	1 3/8	19	13
18		3	8 7/8	4 1/8	23	3 5/8		7	1 3/8	19	13
20		3	8 1/2	4 3/8	25 1/2	3 5/8		7 3/4	1	19 1/8	13 1/8
22		3	9 1/8	4 5/8	27	4		8 1/4	1 1/4	19 3/4	13 3/4
24		3	9 5/8	4 5/8	29 1/4	4 3/8		8 5/8	1 5/8	20 3/8	14 3/8
28		3 1/2	11	5 1/2	34 1/4	5		9 3/4	1	23 1/2	16 1/2
30		3 1/2	11 1/2	7 1/4	34	6 1/2		9 3/4	1 1/4	25 3/4	18 3/4
36	Use quills not sleeves	11	7 7/8	40 1/4	7	11 1/8	Use quills	11 1/8	1 1/8	18 1/8	18 1/8
42		12 1/8	9 7/8	48	8 1/8	11 3/4		11 3/4	2 1/8	22 3/4	22 3/4
48		13 5/8	11	54	9 3/8	14 1/2		14 1/2	1 7/8	24 5/8	24 5/8
54		16	12 3/8	60 1/2	11	14 3/4		14 3/4	1 5/8	28 3/8	28 3/8
60		16 1/2	13 3/8	67 3/4	11	14 1/2		14 1/2	1 3/4	30 1/4	30 1/4
72		20 3/4	16	83	13 1/4	19 1/2		19 1/2	2	36 3/4	36 3/4

NOTE:—FOR clutches over 30 inches we recommend quills in place of sleeves.

DODGE PATENT SPLIT FRICTION CLUTCHES

USE OF OFF-SET COLLARS AND SPECIAL E PARTS WITH DODGE PATENT SPLIT FRICTION CLUTCHES AND CUT-OFF COUPLINGS

When clutches are bored near the maximum shaft size, the regular split collar is of a diameter greater than the H diameter of F ring, shown on page 427, and necessitates the use of an off-set collar.

Clutch Size	Shaft Sizes Requiring Off-set Stop Collars	Width of Collar	Clutch Size	Shaft Sizes Requiring Off-set Stop Collars	Width of Collar
*10	2 $\frac{3}{8}$ to 2 $\frac{1}{2}$ inclusive	...	28	6 $\frac{1}{8}$ to 7 inclusive	5 $\frac{1}{2}$
*12	2 $\frac{3}{8}$ to 3 inclusive	...	30	6 $\frac{1}{8}$ to 7 $\frac{1}{2}$ inclusive	5 $\frac{3}{4}$
*14	3 $\frac{1}{8}$ to 3 $\frac{1}{2}$ inclusive	...	36	6 $\frac{1}{8}$ to 8 inclusive	5 $\frac{3}{4}$
16	3 $\frac{1}{8}$ to 4 $\frac{1}{2}$ inclusive	4 $\frac{1}{4}$	42	7 $\frac{1}{8}$ to 10 inclusive	6
18	3 $\frac{1}{8}$ to 5 inclusive	5	48	9 $\frac{1}{8}$ to 10 inclusive	6
20	4 $\frac{1}{8}$ to 6 inclusive	5	54	9 $\frac{1}{8}$ to 12 inclusive	6
22	4 $\frac{1}{8}$ to 6 inclusive	5	60	9 $\frac{1}{8}$ to 12 inclusive	6
24	4 $\frac{1}{8}$ to 6 $\frac{1}{2}$ inclusive	5			

*Special E Parts.

PRICE LIST OF MECHANISMS ONLY WITHOUT SLEEVES OR QUILLS

Size of Clutch Inches	*H. P. at 100 R. P. M.	**Maximum Speed at Regular Price	Largest Possible Bore	Price
10	6	450	2 $\frac{1}{2}$	\$ 38.50
12	10	440	3	45.50
14	15	430	3 $\frac{1}{2}$	54.50
16	20	420	4 $\frac{1}{2}$	70.00
18	25	410	5	90.00
20	32	400	6	110.00
22	40	390	6	135.00
24	50	380	6 $\frac{1}{2}$	155.00
28	80	360	7	190.00
30	100	350	7 $\frac{1}{2}$	238.00
36	130	325	8	310.00
42	175	300	10	380.00
48	240	275	10	455.00
54	340	250	12	575.00
60	500	225	12	720.00
72	1000	175	15	1600.00

*For horse power ratings at speeds other than 100 R. P.

M., see page 426.

**These are the maximum allowable speeds for the mechanisms only as they are regularly made and sold. These speeds are affected, however, by the kind of sleeve used, which must be taken into account. Clutches for higher speeds can be furnished when desired, and prices will be quoted on application.

Prices on clutches, 10 inches to 36 inches, include shifter yoke and fulcrum. Sizes 42 inch to 72 inch require a geared type of shifter, which is not included in above price.

CAST IRON SLEEVES

Size Shaft	Cast Iron Sleeve		Size Shaft	Cast Iron Sleeve		Size Shaft	Cast Iron Sleeve		Size Shaft	Cast Iron Sleeve	
10 Inch Clutch			16 Inch Clutch			18 Inch Clutch			22 Inch Clutch		
1 1/4-1 1/2	O. D.	2 1/2	1 1/2-2 1/4	O. D.	3 1/4	4 1/4	O. D.	6 1/4	3 1/2	O. D.	5 1/2
	Keyway	1 1/2 x 1/4		Keyway	1 1/2 x 1/4		Keyway	1 1/2 x 1/4		Keyway	1 1/2 x 1/4
1 1/2-2 1/4	O. D.	3 1/4	2 1/4	O. D.	3 1/2	4 1/2	O. D.	7 1/4	4 1/4	O. D.	6 1/4
	Keyway	1 1/2 x 1/4		Keyway	1 1/2 x 1/4		Keyway	2 x 1/4		Keyway	1 1/2 x 1/4
2 1/4	O. D.	3 1/2	2 1/2-2 3/4	O. D.	4 1/4	4 1/2	O. D.	7 1/2	4 1/2	O. D.	7 1/4
	Keyway	1 x 1/4		Keyway	1 1/2 x 1/4					Keyway	2 x 1/4
12 Inch Clutch			3 1/4	O. D.	4 1/2	20 Inch Clutch			5 1/4	O. D.	8
1 1/4-1 1/2	O. D.	2 1/2	3 1/2	Keyway	1 1/2 x 1/4	2 1/2-2 3/4	O. D.	4 1/2	5 1/4	Keyway	2 x 1/4
	Keyway	1 1/2 x 1/4		Keyway	1 1/2 x 1/4		Keyway	1 1/2 x 1/4		Keyway	2 1/2 x 1/4
1 1/2-2 1/4	O. D.	3 1/4	3 3/4	O. D.	5 1/4	3 1/4	O. D.	4 1/2	5 1/2	O. D.	8 1/4
	Keyway	1 1/2 x 1/4		Keyway	1 1/2 x 1/4		Keyway	1 1/2 x 1/4		Keyway	2 1/2 x 1/4
2 1/4	O. D.	3 1/2	3 1/2	O. D.	5 1/2	3 3/4-3 1/2	O. D.	5 1/2			
	Keyway	1 x 1/4		Keyway	1 1/2 x 1/4		Keyway	1 1/2 x 1/4			
2 1/2-2 3/4	O. D.	4 1/4	4 1/4	O. D.	6 1/4	3 1/2	O. D.	5 1/4			
	Keyway	1 1/2 x 1/4		Keyway	1 1/2 x 1/4		Keyway	1 1/2 x 1/4			
14 Inch Clutch			4 1/4	O. D.	6 1/2	4 1/2	O. D.	6 1/2			
1 1/4-1 1/2	O. D.	2 1/2		Keyway	1 1/2 x 1/4	5 1/2	Keyway	2 x 1/4			
	Keyway	1 1/2 x 1/4				5 3/4	O. D.	8			
1 1/2-2 1/4	O. D.	3 1/4	18 Inch Clutch			5 1/2	Keyway	2 x 1/4			
	Keyway	1 x 1/4	2 1/4	O. D.	3 1/2	5 3/4	O. D.	8 1/4			
2 1/4	O. D.	3 1/2	2 1/2-2 3/4	Keyway	1 x 1/4	5 1/2	Keyway	2 1/2 x 1/4			
	Keyway	1 1/2 x 1/4		Keyway	1 1/2 x 1/4						
2 1/2-2 3/4	O. D.	4 1/4	3 1/4	O. D.	4 1/2	22 Inch Clutch			6 1/4	O. D.	9 1/4
	Keyway	1 1/2 x 1/4		Keyway	1 1/2 x 1/4	2 1/2-2 3/4	O. D.	4 1/2			
3 1/4	O. D.	4 1/2	3 1/2	O. D.	5 1/4	3 1/4	Keyway	1 1/2 x 1/4			
	Keyway	1 1/2 x 1/4		Keyway	1 1/2 x 1/4		Keyway	1 1/2 x 1/4			
3 1/2	O. D.	5 1/4	3 3/4-3 1/2	O. D.	5 1/2	3 1/2	O. D.	5 1/2			
	Keyway	1 1/2 x 1/4		Keyway	1 1/2 x 1/4		Keyway	1 1/2 x 1/4			
3 3/4	O. D.	5 1/2	3 1/2	O. D.	5 1/2	3 3/4-3 1/2	O. D.	5 1/2			
	Keyway	1 1/2 x 1/4		Keyway	1 1/2 x 1/4		Keyway	1 1/2 x 1/4			

DODGE PATENT SPLIT FRICTION CLUTCHES

COMPLETE WITH CAST IRON SLEEVE

Prices do not include any pulley, gear, sheave or sprocket which may be used in connection with clutch. The cost of such wheels must be added to that of the clutch proper to get total price.

PRICE LIST

No. of Sprockets in Line	H. P. at 100 R.P.M.	Shaft Size Inches	WIDTH OF PULLEY IN INCHES															
			4	5	6	7	8	9	10	11	12	14	16	18	20	22	24	
10	6	1 1/2 - 1 1/2	\$70.15	\$71.10	\$72.15	\$74.10	\$73.15	\$75.10	\$76.15	.....	.....	.....	.....	.....	.....	.....	.....
		1 1/2 - 2 1/2	72.60	73.75	74.85	76.05	77.25	78.30	79.50	.....	.....	.....	.....	.....	.....	.....	.....
		2 1/2 - 2 1/2	73.65	74.95	76.05	77.75	78.45	79.50	80.70	.....	.....	.....	.....	.....	.....	.....	.....
12	10	1 1/2 - 1 1/2	80.65	81.60	82.65	83.65	84.60	85.60	86.65	.....	.....	.....	.....	.....	.....	.....	.....
		1 1/2 - 2 1/2	83.10	84.25	85.35	86.55	87.75	88.80	90.00	\$91.15	\$92.25	.....	.....	.....	.....	.....	.....
		2 1/2 - 2 1/2	84.15	85.45	86.55	87.75	88.95	90.00	91.20	92.40	93.60	.....	.....	.....	.....	.....	.....
14	15	2 1/2 - 2 1/2	85.20	86.40	87.75	88.95	90.15	91.35	92.55	93.75	94.95	.....	.....	.....	.....	.....	.....
		1 1/2 - 1 1/2	94.15	95.10	96.15	97.15	98.10	99.10	100.15	.....	.....	.....	.....	.....	.....	.....	.....
		1 1/2 - 2 1/2	96.60	97.75	98.85	100.05	101.25	102.45	103.50	104.70	105.90	107.10	.....	.....	.....	.....	.....
16	20	2 1/2 - 2 1/2	97.65	98.95	100.05	101.25	102.45	103.50	104.70	105.90	107.10	.....	.....	.....	.....	.....	.....
		2 1/2 - 3 1/2	98.70	99.90	101.25	102.45	103.65	104.85	106.05	107.25	108.45	\$110.85	\$113.25	.....	.....	.....	.....
		3 1/2 - 3 1/2	101.25	102.60	103.95	105.40	106.80	108.15	109.50	110.95	112.30	114.75	117.15	.....	.....	.....	.....
18	25	3 1/2 - 3 1/2	104.25	105.60	106.95	108.40	109.90	111.40	112.90	114.45	115.95	118.95	121.95	.....	.....	.....	.....
		1 1/2 - 2 1/2	.....	.....	123.30	124.50	125.70	126.75	127.95	129.00	130.20	.....	.....	.....	.....	.....	.....
		2 1/2 - 2 1/2	.....	.....	124.50	125.70	126.90	127.95	129.15	130.35	131.55	.....	.....	.....	.....	.....	.....
20	32	2 1/2 - 2 1/2	.....	.....	125.70	126.90	128.10	129.30	130.50	131.70	132.90	135.30	138.30	141.15	.....	.....	.....
		3 1/2 - 3 1/2	.....	.....	127.90	129.30	130.65	132.00	133.35	134.70	135.90	138.30	141.15	144.90	\$147.90	.....	.....
		3 1/2 - 3 1/2	.....	.....	130.50	131.95	133.30	134.55	136.05	137.40	138.90	141.90	144.90	147.90	150.90	.....	.....
22	40	3 1/2 - 3 1/2	.....	.....	132.90	134.40	135.90	137.40	138.90	140.40	141.90	144.90	147.90	150.90	.....	.....	.....
		4 1/2 - 4 1/2	.....	.....	136.65	138.30	139.95	141.60	143.25	144.90	146.55	149.85	153.15	156.45	.....	.....	.....
		4 1/2 - 4 1/2	.....	.....	154.50	155.70	156.90	157.95	159.15	160.35	161.55	.....	.....	.....	.....	.....	.....
24	50	2 1/2 - 2 1/2	.....	.....	155.70	156.90	158.10	159.30	160.50	161.70	162.90	165.30	167.70	.....	.....	.....	.....
		3 1/2 - 3 1/2	.....	.....	157.90	159.30	160.65	162.00	163.35	164.65	165.90	168.30	171.15	.....	.....	.....	.....
		3 1/2 - 3 1/2	.....	.....	160.50	161.95	163.30	164.65	166.05	167.40	168.90	171.90	174.90	177.90	\$180.90	.....	.....
26	60	3 1/2 - 3 1/2	.....	.....	162.90	164.40	165.90	167.40	168.90	170.40	171.90	174.90	177.90	180.90	183.90	.....	.....
		4 1/2 - 4 1/2	.....	.....	166.65	168.30	169.95	171.60	173.25	174.90	176.55	179.85	183.15	186.45	189.75	.....	.....
		4 1/2 - 4 1/2	.....	.....	171.15	173.05	174.90	176.80	178.65	180.55	182.40	186.15	189.90	193.65	197.40	.....	.....
28	80	2 1/2 - 2 1/2	.....	.....	185.70	186.90	188.10	189.30	190.50	191.70	192.90	195.30	197.70	.....	.....	.....	.....
		3 1/2 - 3 1/2	.....	.....	187.90	189.30	190.65	192.00	193.35	194.70	195.90	198.30	201.15	.....	.....	.....	.....
		3 1/2 - 3 1/2	.....	.....	190.50	191.95	193.30	194.65	196.05	197.40	198.90	201.90	204.90	207.90	210.90	213.90	\$216.90
30	100	3 1/2 - 3 1/2	192.90	194.40	195.90	197.40	198.90	200.40	201.90	204.90	207.90	210.90	213.90	216.90	219.75	223.05
		4 1/2 - 4 1/2	196.65	198.30	199.95	201.60	203.25	204.90	206.55	209.85	213.15	216.45	219.75	223.05	226.35	229.65
		4 1/2 - 4 1/2	201.15	203.05	204.90	206.80	208.65	210.55	212.40	216.15	219.90	223.65	227.40	231.15	234.90	238.65
32	120	5 1/2 - 5 1/2	209.20	211.50	213.75	216.00	218.10	220.30	222.45	226.95	231.45	235.95	240.45	244.95	249.45	253.95
		6 1/2 - 6 1/2	217.65	220.05	222.60	225.00	227.55	230.05	232.50	237.55	242.55	246.15	251.25	256.35
		6 1/2 - 6 1/2	223.20	224.40	225.60	226.80	228.00	229.20	230.40	232.80	235.20	238.65	242.40	246.15	250.90	255.65
34	150	2 1/2 - 2 1/2	225.40	226.80	228.15	229.50	230.85	232.20	233.40	235.80	238.65	242.40	246.15	250.90	255.65	260.40
		3 1/2 - 3 1/2	228.00	229.45	230.80	232.15	233.55	234.90	236.40	239.40	242.40	246.15	250.90	255.65	260.40	265.15
		3 1/2 - 3 1/2	230.40	231.90	233.40	234.90	236.40	237.90	239.40	242.40	246.15	250.90	255.65	260.40	265.15	270.90
36	200	4 1/2 - 4 1/2	234.15	235.80	237.45	239.10	240.75	242.40	244.05	247.35	250.65	253.95	257.25	260.55	264.85	269.15
		5 1/2 - 5 1/2	238.65	240.55	242.40	244.30	246.15	248.05	249.90	253.65	257.40	261.15	264.90	268.65	272.40	276.15
		5 1/2 - 5 1/2	246.90	249.00	251.25	253.50	255.80	258.05	259.95	264.45	268.95	273.45	277.95	282.45	286.95	291.45
38	250	6 1/2 - 6 1/2	255.15	257.55	260.10	262.50	265.05	267.55	270.00	275.05	280.05	285.05	290.05	295.05	300.05	305.05
		3 1/2 - 3 1/2	255.40	256.80	258.15	259.50	260.85	262.20	263.40	265.80	268.65	272.40	276.15	280.90	285.65	290.40
		3 1/2 - 3 1/2	258.00	259.45	260.80	262.15	263.55	264.90	266.40	269.40	272.40	276.15	280.90	285.65	290.40	295.15
40	300	4 1/2 - 4 1/2	260.40	261.90	263.40	264.90	266.40	267.90	269.40	272.40	276.15	280.90	285.65	290.40	295.15	300.90
		5 1/2 - 5 1/2	264.15	265.80	267.45	269.10	270.75	272.40	274.05	277.35	280.65	283.95	287.25	290.55	293.85	297.15
		5 1/2 - 5 1/2	268.65	270.55	272.40	274.30	276.15	278.05	279.90	283.65	287.40	291.15	294.90	298.65	302.40	306.15
42	400	6 1/2 - 6 1/2	276.90	279.00	281.25	283.50	285.80	288.05	289.95	294.45	298.95	303.45	307.95	312.45	316.95	321.45
		6 1/2 - 6 1/2	285.15	287.55	290.10	292.50	295.05	297.55	300.00	305.05	310.05	315.05	320.05	325.05	330.05	335.05
		6 1/2 - 6 1/2	295.95	298.50	301.10	303.60	306.15	308.70	311.25	316.25	321.25	326.25	331.25	336.25	341.25	346.25

Larger sizes on application.

Split Friction Clutches with babbitted, capillary bronzed bushed, loose bronzed bushed sleeves and solid cast iron quills. Prices on application.

DODGE PATENT SPLIT FRICTION CUT-OFF COUPLINGS

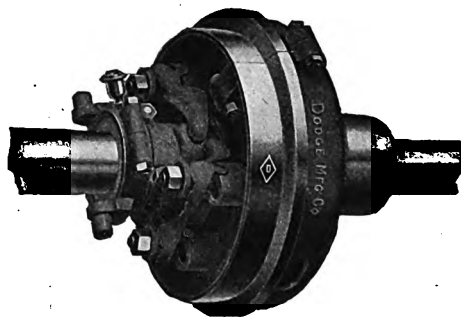


FIG. 1461

The Dodge Patent Split Friction Clutch Cut-off Coupling is used for the purpose of connecting together two sections of shafting in such a way that one section can be stopped or started at will while the other section is operated continuously.

The mechanism of the Dodge Patent Split Friction Cut-off Coupling is the same as is employed with the friction clutch for use with pulleys, gears, sheaves or sprockets. Instead, however, of the extended loose sleeve, a hub part (see above cut) is used, which is keyed to one of the shafts, and which hub is provided with a bronze bushing for receiving the extended part of the other shaft to which is keyed the driving plate of the mechanism. This gives a true male and female bearing for the shafts, and insures absolute alignment.

Any Dodge Patent Split Friction Clutch Cut-off Coupling can be converted into a clutch for carrying a pulley or other wheel, by simply substituting a sleeve for the hub part.

A Cut-Off Coupling of this kind, makes possible a segregation or separate control, of the line shaft equipment as required for the operation of different departments, rooms or floors, of a manufacturing plant. Frequently it is found unnecessary to operate a certain department of a plant. The throwing out of engagement of a cut-off coupling stops the operation of all of the line shaft equipment in that department, saving the power which

would otherwise be required to keep such shafting in operation, as well as much unnecessary wear and tear upon the belting and other equipment.

The Dodge Patent Split Friction Clutch Coupling is a most effective means for the prevention of accidents and injuries to workmen, by making possible the immediate stoppage of the shafting and machinery. In connection with machines of particularly dangerous nature, it is frequently so arranged that the touch of a hand, or the pressure of a button, at such machine will instantly throw out the cut-off coupling upon the shafting and stop all of the equipment.

The Dodge Patent Split Friction Clutch Cut-off Coupling is frequently used in connection with gas or gasoline engine by mounting the hub part upon the end of the crank shaft, and putting the mechanism upon a short and separate shaft. The shaft is carried in a couple of bearings, with the driving pulley or sheave mounted between the two bearings. This is usually to be preferred to the friction clutch pulley as sometimes furnished by the engine builders, on account of the limited space upon the end of the crank shaft, and the necessity of sacrificing many desirable features in any clutch pulley which has an exceedingly limited shaft space available for it.

SUGGESTED MINIMUM SIZES OF DODGE PATENT SPLIT FRICTION CUT-OFF COUPLINGS

TO BE USED WITH DIFFERENT SIZES OF SHAFTS WHEN SPEEDS DO NOT EXCEED 250 R. P. M.

(Subject to exceptions opposite)

Shaft Sizes	Size of Clutch	Shaft Sizes	Size of Clutch
1 $\frac{7}{8}$	10	3 $\frac{1}{8}$	28
1 $\frac{1}{4}$	10	4 $\frac{1}{8}$	30
1 $\frac{3}{8}$	12	4 $\frac{3}{8}$	36
2 $\frac{1}{8}$	14	4 $\frac{1}{2}$	42
2 $\frac{1}{4}$	16	4 $\frac{3}{4}$	42
2 $\frac{3}{8}$	18	5 $\frac{1}{8}$	48
2 $\frac{1}{2}$	20	6	48
3 $\frac{1}{8}$	22	6 $\frac{1}{2}$	54
3 $\frac{1}{4}$	24	7	60
3 $\frac{3}{8}$	28		

EXCEPTIONS

(1) In all cases where a cut-off coupling is used in connection with a single cylinder gasoline engine, use a coupling having a capacity of not less than 100% larger than listed. Gas engine service is very severe.

(2) In all cases where the initial starting load is heavy, where the load is of a variable nature and subject to shocks, use a coupling of 100% greater capacity.

(3) Where speeds are high, use a coupling of 25% to 100% greater capacity so it can pick up load easily and in a short space of time, so that there will be no undue wear on the friction block and plate.

NOTE:—The table of suggested sizes is based upon using a coupling of the same rated capacity as the ordinary rated capacity of the various sizes of shafts shown. Using a coupling of smaller capacity than the capacity of the shaft is bad practice.

DODGE PATENT SPLIT FRICTION CLUTCH CUT-OFF COUPLINGS

DIMENSIONS

Clutch Size	C	D	E	F	H	K	L	M	N	T
10	6 $\frac{7}{8}$	3 $\frac{3}{4}$	14	2 $\frac{1}{4}$	4 $\frac{1}{2}$	1	6 $\frac{1}{4}$	4	2 $\frac{1}{4}$	16 $\frac{1}{8}$
12	7 $\frac{1}{8}$	3 $\frac{3}{4}$	17	2 $\frac{5}{8}$	4 $\frac{1}{2}$	$\frac{3}{4}$	6 $\frac{1}{4}$	4	2 $\frac{1}{4}$	17 $\frac{1}{8}$
14	8 $\frac{1}{2}$	4 $\frac{1}{4}$	19	3	5 $\frac{1}{8}$	$\frac{3}{4}$	6 $\frac{1}{4}$	4	2 $\frac{1}{4}$	19
16	8 $\frac{3}{4}$	4 $\frac{1}{4}$	21	3	6	1 $\frac{3}{8}$	8	4 $\frac{1}{2}$	3 $\frac{1}{2}$	21
18	8 $\frac{7}{8}$	4 $\frac{1}{8}$	23	3 $\frac{5}{8}$	7	$\frac{7}{8}$	8	4 $\frac{1}{2}$	3 $\frac{1}{2}$	21 $\frac{1}{8}$
20	8 $\frac{1}{2}$	4 $\frac{3}{4}$	25 $\frac{1}{2}$	3 $\frac{5}{8}$	7 $\frac{3}{4}$	1	8	4 $\frac{1}{2}$	3 $\frac{1}{2}$	21 $\frac{1}{4}$
22	9 $\frac{1}{8}$	4 $\frac{5}{8}$	27	4	8 $\frac{1}{4}$	1 $\frac{1}{4}$	8	4 $\frac{1}{2}$	3 $\frac{1}{2}$	21 $\frac{3}{4}$
24	9 $\frac{5}{8}$	4 $\frac{3}{4}$	29 $\frac{1}{4}$	4 $\frac{3}{8}$	8 $\frac{5}{8}$	1 $\frac{3}{8}$	8	4 $\frac{1}{2}$	3 $\frac{1}{2}$	22 $\frac{3}{8}$
28	11	5 $\frac{1}{2}$	34 $\frac{1}{4}$	5	9 $\frac{3}{4}$	1	11	6 $\frac{1}{2}$	4 $\frac{1}{2}$	27 $\frac{1}{2}$
30	11 $\frac{1}{2}$	7 $\frac{1}{4}$	34	6 $\frac{1}{2}$	9 $\frac{3}{4}$	1 $\frac{1}{4}$	11	6 $\frac{1}{2}$	4 $\frac{1}{2}$	29 $\frac{3}{4}$
36	11	7 $\frac{1}{8}$	40 $\frac{1}{4}$	7	11 $\frac{1}{8}$	1 $\frac{7}{8}$	12 $\frac{5}{8}$	7 $\frac{1}{8}$	4 $\frac{3}{4}$	31 $\frac{1}{2}$
42	12 $\frac{7}{8}$	9 $\frac{7}{8}$	48	8 $\frac{7}{8}$	11 $\frac{3}{4}$	2 $\frac{1}{8}$	14 $\frac{3}{4}$	9 $\frac{1}{2}$	5 $\frac{1}{4}$	37 $\frac{1}{2}$
48	13 $\frac{5}{8}$	11	54	9 $\frac{3}{8}$	14 $\frac{1}{2}$	1 $\frac{7}{8}$	16 $\frac{1}{2}$	11	5 $\frac{1}{2}$	41 $\frac{1}{8}$
54	16	12 $\frac{3}{8}$	60 $\frac{1}{2}$	11	14 $\frac{3}{4}$	1 $\frac{5}{8}$	18 $\frac{1}{8}$	12 $\frac{3}{8}$	5 $\frac{3}{4}$	46 $\frac{1}{2}$
60	16 $\frac{1}{2}$	13 $\frac{5}{8}$	67 $\frac{1}{4}$	11	14 $\frac{1}{2}$	1 $\frac{3}{4}$	19 $\frac{5}{8}$	13 $\frac{5}{8}$	6	49 $\frac{3}{4}$
72	20 $\frac{3}{4}$	16	83	13 $\frac{1}{4}$	19 $\frac{1}{2}$	2	22 $\frac{1}{2}$	16	6 $\frac{1}{2}$	59 $\frac{1}{4}$

FIG. 1462

NOTE:—(1) When clutches are bored near the maximum shaft size, and the regular split shaft collar is of a diameter greater than the H dimension here shown, it requires the use of an off-set collar.

(2) It is advisable, wherever possible, to put the hub part upon the driving shaft, so mechanism will stand still when the clutch is thrown out.

(3) Do not overlook the fact that a bearing must positively be placed on each shaft close to coupling, to keep shafting in alignment.

(4) For names and illustrations of various parts of clutch coupling, see Page 432.

PRICE LIST—DODGE SPLIT FRICTION CLUTCH CUT-OFF COUPLINGS

Shaft Size	Size of Clutch														
	10	12	14	16	18	20	22	24	28	30	36	42	48	54	72
1 $\frac{1}{8}$	\$48.50	\$55.50	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
1 $\frac{1}{4}$	49.00	56.00	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
1 $\frac{3}{8}$	50.00	57.00	\$66.00	\$83.50	\$.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
2 $\frac{1}{8}$	50.50	57.50	66.50	84.00	104.00	\$.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
2 $\frac{1}{4}$	51.00	58.00	67.00	84.50	104.50	124.50	.....	.....	.....	.....	.....	.....	.....	.....	.....
2 $\frac{3}{8}$	58.50	67.50	85.00	105.00	125.00	\$.....	\$.....	\$.....	.....	.....	.....	.....	.....	.....
2 $\frac{1}{2}$	59.00	68.00	85.50	105.50	125.50	150.50	170.50	213.00	.....	.....	.....	.....	.....	.....
3 $\frac{1}{8}$	68.50	86.00	106.00	126.00	151.00	171.00	213.50	\$.....	.....	.....	.....	.....	.....
3 $\frac{1}{4}$	69.00	87.00	107.00	127.00	152.00	172.00	214.00	262.50	\$.....	.....	.....	.....	.....
3 $\frac{3}{8}$	87.50	107.50	127.50	152.50	172.50	214.50	263.00	338.50	.....	.....	.....	.....
3 $\frac{1}{2}$	88.00	108.00	128.00	153.00	173.00	215.00	263.50	339.00	.....	.....	.....	.....
4 $\frac{1}{8}$	88.50	108.50	128.50	153.50	173.50	215.50	264.00	339.50	\$.....	.....	.....	.....
4 $\frac{1}{4}$	89.00	109.00	129.00	154.00	174.00	216.00	264.50	340.50	415.50	\$.....	.....	.....
4 $\frac{3}{8}$	110.00	130.00	155.00	175.00	217.00	265.50	342.00	417.00	497.00	\$.....	.....
5 $\frac{1}{8}$	131.00	156.00	176.00	218.00	266.50	343.50	418.00	498.00	638.00	.....
6	132.00	157.00	177.00	219.00	267.50	345.00	419.50	499.00	639.00	\$.....
6 $\frac{1}{2}$	346.50	421.00	500.00	640.00	807.00
7	348.00	423.00	501.50	641.00	808.00
7 $\frac{1}{2}$	349.50	424.50	503.00	642.00	809.00
8	351.00	426.00	505.00	643.50	810.00
8 $\frac{1}{2}$	427.50	507.00	646.00	812.50
9	429.00	509.00	648.50	815.00
10	432.50	513.00	653.00	819.00
11	657.50	823.50
12	662.00	828.50

NOTE:—Hub parts will regularly be furnished only of the solid type. Split hub parts are seldom necessary, but can be furnished, when required, at special price.

The above price list is complete and is intended to cover unusual as well as ordinary specifications. Do not overlook the tables on Page 430.

The prices above are for Couplings as regularly made and for speeds not to exceed the maximum speeds mentioned on Page 428.

For horse power ratings of these Couplings at various speeds see Page 426.

PARTS OF DODGE SOLID FRICTION CLUTCHES

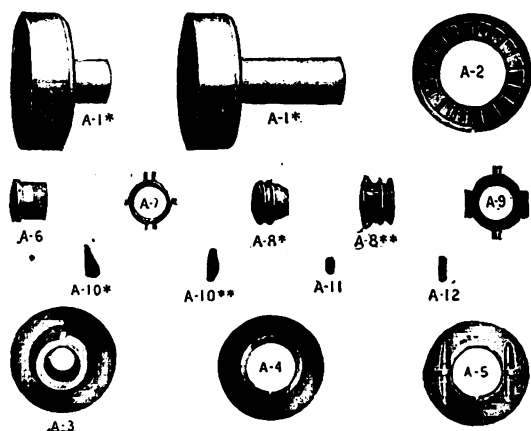


FIG. 1463

DETAILS OF PARTS

- A 1* Sleeve and Casing.
- A 1** Hub for Cut-off Coupling and Casing.
- A 2 Rings which contain the Wooden Friction Blocks.
- A 3 Flanged Hub.
- A 4 Inside Driving Plate.
- A 5 Outside Driving Plate.
- A 6 Extended Bushing or Bearing for A 7 part.
- A 7 Ring which supports Levers.
- A 8* Sliding Collar used on Clutches 9 Inches and Smaller.
- A 8** Sliding Collar used on Clutches 10 Inches and Larger.
- A 9 Ring to which Shifter Yoke is attached.
- A 10* Levers used on Clutches 9 Inches and Smaller.
- A 10** Levers used on Clutches 10 Inches and Larger.
- A 11 Links.
- A 12 Links used on Clutches 10 Inches and larger.

PARTS OF DODGE PATENT SPLIT FRICTION CLUTCHES

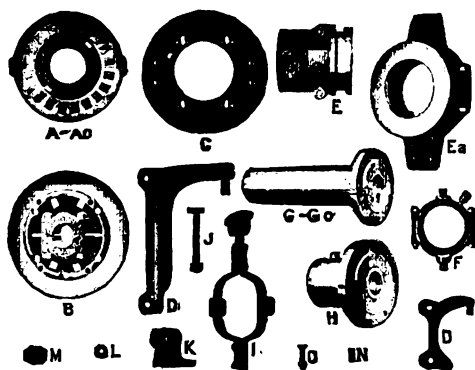


FIG. 1464

DETAILS OF PARTS

- A —Wood Filled Disc.
- Ao—Wood Filled Disc for Clutches 28 inches and under, adopted 1905.
- B —Stationary Friction or Driving Plate.
- C —Outside Friction Plate.
- D —Lever for Clutches 28 inches and under, and over 28 inches since 1900.
- E —Spool or Sliding Collar for Clutches 28 inches and under.
- Ea—Spool or Sliding Collar for Clutches 30 inches and over adopted 1900.
- F —Thrust Collar.
- G —Extended Sleeve.
- Go—Extended Sleeve for Clutches 28 inches and under, adopted 1905.
- H —Cut-off Coupling Hub.
- I —Shifter Yoke.
- J —Draw Bolt.
- K —Link for large Levers, adopted 1900.
- L —Main Washers.
- M —Jam Nut.
- N —Spring.
- O —Bolt for Sleeve or Coupling Connection to Disc.

NOTE.—Parts A and B in Clutches over 30 inches have Arms instead of Web or Shell.

When ordering Clutch Parts, give size of Clutch and the symbol shown on the part itself; if it is a bored part, the shaft size must also be given.

PRICE LIST OF PARTS OF DODGE SOLID FRICTION CLUTCHES

PRICES SHOWN BELOW ARE FOR ONE PIECE ONLY, IRRESPECTIVE OF NUMBER OF PIECES TO THE CLUTCH

Clutch Size Ins.	A-1*	A-2	A-3	A-4	A-5	A-6	A-7	A-8	A-9	A-10	A-11
4	\$5.90	\$1.05	\$2.45	\$1.10	\$1.10	\$1.10	\$0.20	\$0.80	\$0.60	\$0.25	\$0.20
5	7.00	1.15	2.90	1.40	1.30	1.30	.30	1.25	.65	.25	.20
6	7.65	1.30	3.45	1.70	1.55	1.45	.40	1.60	.70	.30	.20
7	9.20	1.70	4.60	2.05	2.10	1.65	.45	1.75	.75	.35	.25
8	11.35	2.05	5.65	2.45	2.35	1.90	.55	2.30	1.00	.45	.30

Clutch Size Ins.	A-1*	A-2	A-3	A-4	A-5	A-6	A-7	A-8	A-9	A-10	A-11	A-12
9	12.45	2.45	6.00	2.70	2.55	2.20	.65	2.70	1.35	.45	.30	....
10	14.55	3.00	8.15	3.80	3.25	2.80	.75	3.15	1.65	.50	.30	.30
12	18.20	3.70	9.50	4.40	4.00	3.45	.90	3.70	1.80	.60	.40	.40
14	26.30	5.35	13.70	6.35	5.80	5.00	1.30	5.35	2.60	.90	.60	.60
16	40.50	5.45	21.05	4.85	8.65	7.95	2.00	8.25	4.00	.95	.65	.65

*This symbol designates two different parts: (1) The loose sleeve which carries the pulley when used as clutch; (2) The keyed hub part when used as cut-off coupling. When ordering this part state definitely:

1—Size of Clutch.

2—Bore.

3—Outside Diameter of Sleeve.

4—Length of Sleeve.

5—If hub part of cut-off coupling, give sizes of both shafts.

NUMBER OF PIECES TO EACH CLUTCH

A-1 one piece all sizes; A-2 three pieces sizes 4"-5"-6" and 16", two pieces all other sizes; A-3 one piece all sizes; A-4 two pieces sizes 4"-5"-6" and 16", other sizes one piece; A-5, A-6, A-7, A-8, A-9 one piece all sizes; A-10 two pieces all sizes but 16", 16" three pieces; A-11 four pieces all sizes but 16", 16" six pieces; A-12 four pieces sizes 10", 12" and 14", 16" six pieces.

PRICE LIST OF PARTS OF DODGE PATENT SPLIT FRICTION CLUTCHES

Clutch Size		A	B	C	D	E	F	I	J	L	M	N	O
10	Price, Each	\$15.60	\$10.45	\$ 7.75	\$1.10	\$5.05	\$4.20	\$6.50	\$.90	\$.15	\$.08	\$.13	\$.12
12	Price, Each	17.90	12.80	9.25	1.40	5.90	4.80	6.50	1.00	.15	.08	.14	.14
14	Price, Each	25.15	13.80	11.50	1.85	6.85	4.80	7.00	1.00	.20	.10	.15	.16
16	Price, Each	30.95	20.75	15.60	2.35	9.00	6.00	7.00	1.15	.25	.10	.15	.20
18	Price, Each	41.05	27.95	20.80	3.20	10.50	8.00	7.60	1.25	.30	.12	.17	.22
20	Price, Each	52.90	35.00	26.00	3.70	13.40	8.10	7.60	1.25	.35	.12	.17	.24
22	Price, Each	63.35	46.10	32.90	4.40	16.80	9.60	8.30	1.45	.40	.15	.18	.26
24	Price, Each	73.60	54.65	38.80	4.85	17.80	11.50	8.30	1.65	.45	.15	.18	.28

Prices shown above are for one piece only, irrespective of number of pieces to the clutch

NUMBER OF PIECES TO EACH CLUTCH

Parts marked A, B, C, E, F and I, one piece for each clutch.

Parts marked J, L, M and N, four pieces for each clutch.

Part marked O Clutch sizes 10", 12" and 14" 6-1/2; other sizes 6-5/8.

Part marked D two pieces for each clutch

DODGE SOLID JOURNAL BEARINGS



FIG. 1477

These bearings are intended for use where the powers and speeds are moderate, and where a low first cost is an object.

The bearings are babbitted, and the babbitt is bored and reamed to shaft size. The oil pocket is so placed as to permit the use of the bearings on posts when so desired.

PRICE LIST

Shaft Size, Inches	Price	Shaft Size, Inches	Price	Shaft Size, Inches	Price
$1\frac{1}{8}$	\$0.95	$1\frac{1}{8}$	\$2.10	$2\frac{1}{8}$	\$4.80
$1\frac{1}{4}$	1.20	$2\frac{1}{4}$	2.70	$3\frac{1}{8}$	5.90
$1\frac{3}{8}$	1.50	$2\frac{3}{8}$	3.20	$3\frac{1}{4}$	7.30
$1\frac{1}{2}$	1.80	$2\frac{1}{2}$	3.60	$3\frac{3}{4}$	9.00
				$3\frac{1}{2}$	11.00

DODGE COMMON FLAT BOXES

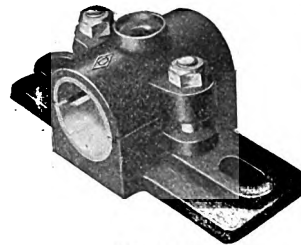


FIG. 1478

The Dodge Common Flat Box, while low in price, is exceptionally well made for a bearing of this kind. A good grade of babbitt is used, which is bored and reamed to shaft size. This bearing is extensively used in many classes of work where moderate powers are involved and where the conditions are such as make unnecessary the use of the heavier and self-oiling types of pillow blocks.

Horizontal adjustment is secured by the elongated bolt slots in base.

PRICE LIST

Shaft Size, Inches	Price	Shaft Size, Inches	Price	Shaft Size, Inches	Price
$1\frac{1}{8}$	\$1.00	$2\frac{3}{8}$	\$2.80	$3\frac{7}{8}$	\$7.60
$1\frac{1}{4}$	1.35	$2\frac{1}{2}$	3.40	$3\frac{1}{2}$	9.50
$1\frac{3}{8}$	1.65	$2\frac{3}{4}$	4.10	$3\frac{3}{4}$	11.80
$1\frac{1}{2}$	2.00	$2\frac{1}{2}$	5.00		
$1\frac{5}{8}$	2.30	$3\frac{1}{8}$	6.20		

DODGE STANDARD RIGID PILLOW BLOCKS

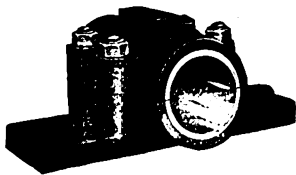


FIG. 1479

This is the heaviest pillow block of the plain oiling type which is made, and it is amply strong and heavy for any service that it may be called upon to meet. A good grade of babbitt is used, which is bored and reamed to shaft size, and the ends of the bearings are faced off for collars.

As made for $2\frac{3}{4}$ inch shaft and larger. Smaller sizes than $2\frac{3}{4}$ inch have only two bolts in cap.

PRICE LIST

Shaft Size Inches	Price	Shaft Size Inches	Price	Shaft Size Inches	Price
$1\frac{1}{8}$	\$1.30	$2\frac{1}{4}$	\$ 7.00	$4\frac{1}{8}$	\$24.00
$1\frac{1}{4}$	1.60	$2\frac{3}{8}$	8.80	$4\frac{1}{4}$	27.00
$1\frac{3}{8}$	2.10	$3\frac{1}{8}$	11.00	$5\frac{1}{8}$	34.00
$1\frac{1}{2}$	2.70	$3\frac{1}{4}$	12.80	$5\frac{3}{8}$	43.00
$1\frac{5}{8}$	3.70	$3\frac{3}{8}$	14.40	$6\frac{1}{2}$	52.00
$2\frac{1}{8}$	4.60	$3\frac{1}{2}$	16.00	7	61.00
$2\frac{3}{8}$	5.50	$4\frac{1}{8}$	18.50	$7\frac{1}{2}$	70.00
		$4\frac{1}{4}$	21.00	8	80.00

DODGE WICK OILING RIGID PILLOW BLOCKS

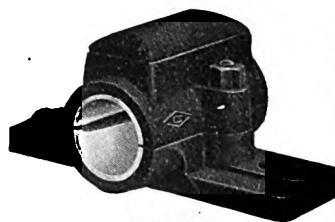


FIG. 1480

This type of pillow block has an oil reservoir in the cap and by means of an absorbent wick the oil is fed directly to the top of the shaft.

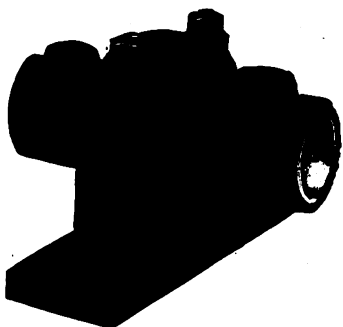
In other respects, it follows the same design and construction as apply to the standard rigid pillow block.

The Wick Oiling Rigid Pillow Block is not made in sizes larger than $3\frac{7}{8}$ inches. For larger shafts we suggest the use of Ring Oiling Rigid Pillow Blocks.

PRICE LIST

Shaft Size Inches	Price	Shaft Size Inches	Price	Shaft Size Inches	Price
$1\frac{1}{8}$	\$1.80	$2\frac{3}{8}$	\$5.00	$3\frac{3}{8}$	\$11.60
$1\frac{1}{4}$	2.30	$2\frac{1}{2}$	6.00	$3\frac{1}{2}$	13.80
$1\frac{3}{8}$	3.00	$2\frac{3}{4}$	7.40		
$1\frac{1}{2}$	4.00	$2\frac{1}{2}$	9.50		

DODGE SPHERICAL BALL AND SOCKET PILLOW BLOCKS



STANDARD
FIG. 1473

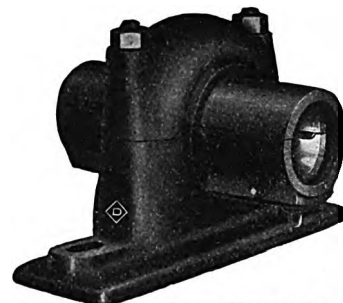
This is a type of pillow block which is preferred by some engineers, and it is frequently used in connection with shafts which run at a high speed, and under a heavy load.

The housing is of an improved strong design and the large ball of the bearing fits into the housing in such a way as to give a true and effective ball and socket connection. The oil reservoir of the self oiling type is within the ball of the bearing.

These pillow blocks are made in four styles: Standard (plain oiling), Capillary Oiling, Ring Oiling and Collar Oiling.

The term "spherical" is used to better distinguish this pillow block from the adjustable ball and socket pillow block referred to on Page 430.

Sizes larger than 3½ inches have 4 bolts in base.



CAPILLARY RING AND COLLAR
OILING
FIG. 1474

PRICE LIST

Shaft Size, Inches	Standard Oiling	Capillary Oiling	Ring Oiling	Collar Oiling
1½	\$ 3.30	\$ 5.80	\$ 5.80	\$ 7.80
1⅞	3.90	6.40	6.40	8.50
1⅞	4.60	7.10	7.10	9.20
1⅞	5.60	8.20	8.20	10.50
2⅞	7.00	10.00	10.00	13.80
2⅞	9.00	12.60	12.60	17.00
2⅞	11.50	16.00	16.00	21.00
2⅞	14.00	19.00	19.00	25.00
3⅞	17.00	23.00	23.00	29.00
3⅞	21.00	29.00	29.00	35.00
3⅞	25.00	35.00	35.00	41.00
3⅞	30.00	41.00	41.00	47.00
4⅞	40.00	Not Made	54.00	61.00
4⅞	50.00	" "	68.00	75.00
5⅞	61.00	" "	Not Made	89.00
5⅞	72.00	" "	" "	103.00

DODGE BASE PLATES

DIMENSIONS AND PRICE LIST OF PLAIN AND ADJUSTABLE BASE PLATES FOR SELF-OILING RIGID PILLOW BLOCKS AND QUILL BEARINGS

All catalog dimensions are subject to change and correction. Always secure up-to-date Blue Prints before going ahead with the building of steel or concrete foundations.



FIG. 1475
PLAIN BASE PLATE

Made in two styles for pillow blocks of Dodge standard construction.

The plain type is finished on top and provides for horizontal adjustment only, same being from one to two inches.



FIG. 1476
ADJUSTABLE BASE PLATE

The adjustable is finished and fitted with a set of wedges operated by set screws. These wedges give a total vertical adjustment of three-eighths of an inch.

Horizontal adjustment is provided or the same as in the plain type.

Shaft Size, Inches	Symbol on Base Plates	General Dimensions						Plain Base Plates		Adjusta- ble Base Plates	
		B	C	D	E	Bolts F	H	M	Price	M	Price
1½	E	18¾	3	16¼	.....	5/8	1⅞	4	\$4.25	5¾	\$6.50
2⅞	F	19½	3½	17½	.....	5/8	1¼	4½	4.85	5½	7.30
2⅞	G	21½	4 1/8	19½	.....	3/4	1¼	4½	5.95	7½	8.90
2⅞	H	22	4½	19½	.....	3/4	1¼	5	6.80	7	10.20
2⅞	K	22½	5½	20¾	.....	7/8	1¾	4½	8.10	6¾	12.10
3⅞	L	24	5½	22	3½	5/8	1¾	5½	9.05	7¼	13.55
3⅞	M	25¾	5¼	22¾	3	3/4	1½	5½	10.00	7½	15.00
3⅞	N	26	5¾	24	3¾	3/4	1½	5¾	11.00	8	16.50
3⅞	O	26¼	6¼	23¾	3¾	7/8	1½	6	12.00	8½	18.00
4⅞	P	27¼	6¾	24½	4¼	1	1½	6¼	14.65	9	22.00
4⅞	R	28¼	7¾	25¼	4½	1½	1½	6½	17.35	9¼	26.00
4⅞	T	27¾	8 1/8	25	5 1/8	1½	1¾	7¾	21.00	10¾	31.50

Larger sizes on application.

DODGE ADJUSTABLE, BALL AND SOCKET, SHORT DROP HEAD SHAFT HANGERS AND PILLOW BLOCKS

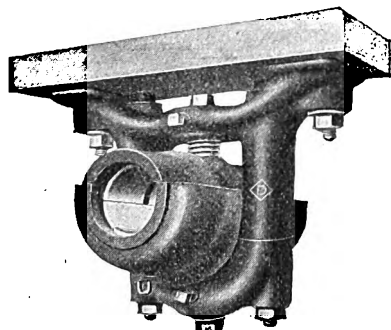


FIG. 1493

The adjustable ball and socket pillow block is one of the most serviceable and desirable of all Dodge pillow blocks for general all-around line shaft service.

In addition to the always desirable ball and socket connection of the bearing in the frame, this pillow block offers the additional advantage of a vertical adjustment of the bearing, which makes it possible to line up the shafting with every facility, and without the use of base plates.

It is a most excellent pillow block from every standpoint. Exactly the same bearings are employed as are used with the Dodge Ball and Socket Hangers, as shown on Page 440.

By inverting the frame, these pillow blocks are frequently used as short drop head shaft hangers.

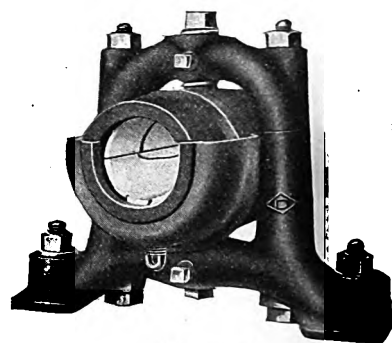


FIG. 1494

PRICE LIST COMPLETE WITH BEARINGS

Shaft Size, Inches	Drop, Inches	WITH BEARINGS OF			WITHOUT BEARINGS Frame Only
		Standard Type	Capillary Type	Ring Type	
1 1/8	3 3/4	\$ 4.45	\$ 5.25	\$ 5.45	\$ 3.00
1 1/8	"	4.55	5.50	5.70	3.00
1 1/8	4 3/8	6.65	8.55	8.80	4.50
2 1/8	5	8.70	10.70	10.95	6.00
2 1/8	"	9.35	11.30	11.60	6.00
2 1/8	5 5/8	13.45	16.05	16.40	9.50
2 1/8	"	15.40	18.80	19.15	9.50
3 1/8	6 1/4	19.55	27.85	28.25	13.00
3 1/8	"	20.00	30.20	30.70	13.00
3 1/8	6 3/4	26.75	35.35	35.90	16.50
3 1/8	"	30.00	37.10	37.70	16.50
4 1/8	7 1/2	34.65	Not Made	42.10	20.00
4 1/8	"	35.90	"	44.85	20.00
4 1/8	8 1/4	42.50	"	53.75	23.50
4 1/8	"	45.55	"	58.90	23.50

For price list of Bearings only, see Page 440.

PRICE LIST OF CAST IRON SHOES FOR ABOVE HANGERS

Frame Symbol	TO MAKE DROP OF HANGER		
	8"	10"	12"
D	\$4.60	\$ 6.80	.....
E	5.40	7.80	.....
G	6.20	8.80	.....
K	9.00	9.60	.....
M	....	9.80	\$12.60
O	....	10.20	13.15
R	....	13.00	15.80
T	....	.....	18.80

DODGE STANDARD RIGID POST BEARINGS

This type of bearing is used where shafting is supported from posts or columns.

Ample vertical adjustment is secured by means of elongated slots in the back plate or base.

The bearings are babbitted with a good quality of babbitt metal which is bored and reamed to size.

A standard dimension of 6 inches from post to shaft center is maintained in all sizes.

PRICE LIST

Shaft Size, Inches	List Price	Shaft Size, Inches	List Price
1 1/8	\$ 3.25	3 1/8	\$12.70
1 1/8	3.60	3 1/8	14.10
1 1/8	4.10	3 1/8	18.40
1 1/8	5.45	3 1/8	22.40
2 1/8	7.25	4 1/8	27.15
2 1/8	8.35	4 1/8	31.90
2 1/8	9.15	4 1/8	40.10
2 1/8	10.35	5 1/8	55.00

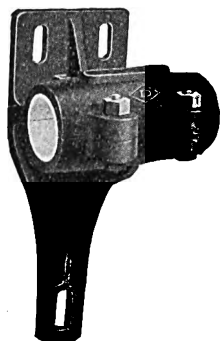


FIG. 1495
AS MADE UP TO 3 IN.

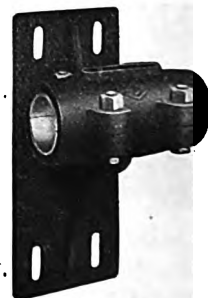


FIG. 1496
AS MADE ABOVE 3 IN.

DODGE CAPILLARY AND RING-OILING RIGID POST BEARINGS

These types of bearings are used where shafting is supported from posts or columns.

Ample vertical adjustment is secured by means of elongated slots in the back plate or base.

These bearings are so arranged that when the oil has worked out to the ends of the bearings, it is automatically wiped off and returned to the reservoir. This allows the bearings to run for months on one filling of the reservoir, eliminates the constant daily attendance which is required with plain bearings and brings about a considerable saving in the consumption of oil.

FIG. 1471

The capillary or ring oiling rigid post bearings can also be furnished in dust-tight construction, which is desirable when the bearings are used in places where dust and grit might get to the inside of bearings of regular construction.

PRICE LIST

Shaft Size, Inches	List Price	Shaft Size, Inches	List Price
1 $\frac{7}{8}$	\$ 4.70	3 $\frac{7}{8}$	\$24.85
1 $\frac{1}{4}$	5.35	3 $\frac{1}{2}$	28.55
1 $\frac{1}{2}$	7.00	3 $\frac{3}{4}$	32.10
2 $\frac{1}{8}$	9.10	4 $\frac{1}{8}$	38.55
2 $\frac{1}{4}$	11.65	4 $\frac{1}{4}$	45.00
2 $\frac{1}{2}$	14.65	4 $\frac{1}{2}$	51.45
2 $\frac{3}{4}$	17.95	5 $\frac{1}{8}$	70.00
3 $\frac{1}{8}$	21.40	5 $\frac{1}{4}$	95.00

Note:—Capillary type is not made in sizes larger than 3 $\frac{1}{4}$.
The capillary oiler is explained on Page 440.

DODGE CAPILLARY AND RING-OILING RIGID PILLOW BLOCKS

MADE 4 $\frac{1}{2}$ INCHES AND UP, SMALLER SIZES 2 BOLTS IN BASE

These types of self-oiling rigid pillow blocks possess many valuable and important advantages, which may be briefly summed up as follows:

- (1) They are heavy and substantial in form, which adapts them for the most severe service.
- (2) The large bearing area insures a reasonable pressure per square inch upon the liner.
- (3) The methods of lubrication are positive and perfect.
- (4) The oil reservoirs are large, and effective shaft wipers turn the oil to the reservoir when it has worked out to the ends of the bearings.
- (5) An exceptionally desirable grade of babbitt is used, which possesses that peculiar combination of requisite hardness on the one hand to give good anti-friction qualities, and requisite ductility on the other hand to allow it readily to conform to the shaft without heating.
- (6) A decided saving in oil bills, as one filling of the reservoir will last for several months.
- (7) The elimination of constant attendance in oiling the bearings saves a considerable labor charge, and eliminates in turn that risk of accident and injury to workmen which always exists when men are compelled to work around a fast revolving shaft.
- (8) When for use in dusty and dirty places, these bearings can be ordered with dustproof ends, which effectively prevent any dust or grit from getting into the inside of the bearings.



FIG. 1472

SIZES AND PRICES

Shaft Size, Inches	List Price	Shaft Size, Inches	List Price	Shaft Size, Inches	List Price
1 $\frac{3}{8}$	\$ 4.50	3 $\frac{7}{8}$	\$22.00	7	\$108.00
1 $\frac{1}{2}$	5.00	3 $\frac{1}{2}$	27.00	7 $\frac{1}{2}$	122.00
1 $\frac{3}{4}$	5.70	3 $\frac{3}{4}$	32.00	8	136.00
1 $\frac{1}{4}$	6.80	4 $\frac{1}{8}$	37.00	8 $\frac{1}{2}$	150.00
2 $\frac{1}{8}$	8.20	4 $\frac{1}{4}$	42.00	9	165.00
2 $\frac{1}{4}$	9.80	4 $\frac{1}{2}$	54.00	9 $\frac{1}{2}$	180.00
2 $\frac{1}{2}$	12.00	5 $\frac{1}{8}$	66.00	10	195.00
2 $\frac{3}{4}$	14.00	5 $\frac{1}{4}$	80.00	10 $\frac{1}{2}$	210.00
3 $\frac{1}{8}$	18.00	6 $\frac{1}{2}$	94.00		

Note:—Capillary type not made in sizes larger than 3 $\frac{1}{4}$ "

DODGE ADJUSTABLE BALL AND SOCKET POST HANGERS

PRICE LIST

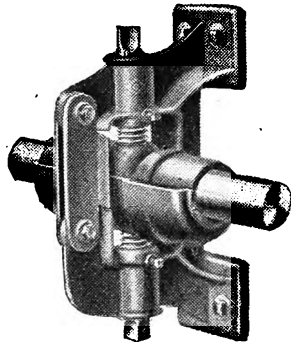


FIG. 1490

Shaft Size Inches	WITHOUT BEARINGS	WITH BEARINGS OF		
	Frame Only	Standard Type	Capillary Type	Ring Type
$1\frac{1}{8}$	\$ 3.60	\$ 4.40	\$ 5.35	Not Made
$1\frac{1}{4}$	3.60	4.50	5.50	\$ 5.70
$1\frac{3}{8}$	4.05	5.50	6.30	6.50
$1\frac{1}{2}$	4.05	5.60	6.55	6.75
$1\frac{5}{8}$	5.00	7.15	9.05	9.30
$2\frac{1}{8}$	7.05	9.75	11.75	12.00
$2\frac{1}{4}$	7.05	10.40	12.35	12.65
$2\frac{3}{8}$	9.05	13.00	15.60	15.95
$2\frac{1}{2}$	9.05	14.95	18.35	18.70
$3\frac{1}{8}$	12.45	19.00	27.30	27.70
$3\frac{1}{4}$	12.45	19.45	29.65	30.15
$3\frac{3}{8}$	15.20	25.45	34.05	34.60
$3\frac{1}{2}$	15.20	28.70	35.80	36.40
$4\frac{1}{8}$	18.20	32.85	Not Made	40.30
$4\frac{1}{4}$	18.20	34.10	"	43.05
$4\frac{3}{8}$	24.35	43.35	"	54.60
$4\frac{1}{2}$	24.35	46.40	"	59.75

For illustrations and prices of the above different types of bearings, see Page 440.

DODGE ADJUSTABLE BALL AND SOCKET BRACKET HANGERS

These bracket hangers are for use on walls where a greater reach is required than is given by the regular post hanger.

When heavier shafts are involved than $2\frac{1}{4}$ we recommend the use of wall brackets.

PRICE LIST

Shaft Size, Inches	Reach, Inches	WITHOUT BEARING	COMPLETE WITH BEARING OF		
		Frame Only	Standard Type	Capillary Type	Ring Type
$1\frac{1}{8}$	12	\$ 4.25	\$ 5.15	\$ 6.15	\$ 6.35
$1\frac{1}{4}$	18	5.30	6.20	7.20	7.40
$1\frac{3}{8}$	12	4.25	5.70	6.50	6.70
$1\frac{1}{2}$	18	5.30	6.75	7.55	7.75
$1\frac{5}{8}$	12	4.25	5.80	6.75	6.95
$1\frac{3}{4}$	18	5.30	6.85	7.80	8.00
$1\frac{7}{8}$	12	6.20	8.35	10.25	10.50
$2\frac{1}{8}$	18	7.50	9.65	11.55	11.80
$2\frac{1}{4}$	12	8.50	11.20	13.20	13.45
$2\frac{3}{8}$	18	10.00	12.70	14.70	14.95
$2\frac{1}{2}$	12	8.50	11.85	13.80	14.10
$2\frac{7}{8}$	18	10.00	13.35	15.30	15.60

For price list of bearings only, see Page 440.

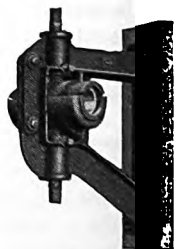


FIG. 1491

DODGE ADJUSTABLE BALL AND SOCKET DROP HANGERS

WITH STANDARD AND SELF-OILING BEARINGS

Dodge Ball and Socket Hangers successfully meet all requirements. When properly supported and lined up, the alignment of the shafting will be permanently maintained. The reduction in the frictional load; the saving in the cost of coal, or of electric current consumed, as well as of oil; the practical elimination of all cost of attendance; and the elimination of all personal injury risk as a natural result of making attendance unnecessary, are features which establish the great and permanent value of Dodge hangers.

For illustration, description and prices of bearings see Page 440.

When ordering state style of bearing desired. Unless otherwise specified standard type bearing will be furnished.

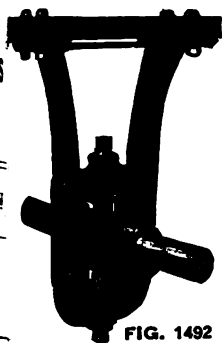


FIG. 1492

Symbol	Size of Shaft	Type of Bearing	Drop in Inches									
			8 in.	10 in.	12 in.	14 in.	16 in.	18 in.	20 in.	24 in.	30 in.	36 in.
B	1 1/8"	Standard.....	\$ 3.85	\$ 4.00	\$ 4.20	\$ 4.45	.....	.....	.....	.....	.....	.....
		Capillary.....	4.80	4.95	5.15	5.40	.....	.....	.....	.....	.....	.....
		Ring.....	Not made	.....	.....	.....	.....	.....	.....	.....	.....	.....
	1 1/4"	Standard.....	\$3.95	\$4.10	\$4.30	\$4.55	.....	.....	.....	.....	.....	.....
		Wick-Oiling.....	4.15	4.30	4.50	4.75	.....	.....	.....	.....	.....	.....
		Capillary.....	4.95	5.10	5.30	5.55	.....	.....	.....	.....	.....	.....
D	1 1/2"	Standard.....	\$4.90	\$5.05	\$5.25	\$5.50	\$5.60	\$6.00	\$6.45	.....	.....	.....
		Wick-Oiling.....	5.25	5.40	5.60	5.85	5.95	6.35	6.80	.....	.....	.....
		Capillary.....	5.70	5.85	6.05	6.30	6.40	6.80	7.25	.....	.....	.....
	1 3/4"	Standard.....	\$5.00	\$5.15	\$5.35	\$5.60	\$5.70	\$6.10	\$6.55	.....	.....	.....
		Wick-Oiling.....	5.35	5.50	5.70	5.95	6.05	6.45	6.90	.....	.....	.....
		Capillary.....	5.95	6.10	6.30	6.55	6.65	7.05	7.50	.....	.....	.....
E	2"	Standard.....	\$6.85	\$7.35	\$7.50	\$7.80	\$ 8.05	\$ 8.30	\$ 8.80	\$ 9.65	.....	.....
		Wick-Oiling.....	7.30	7.80	7.95	8.25	8.50	8.75	9.25	10.10	.....	.....
		Capillary.....	8.75	9.25	9.40	9.70	9.95	10.20	10.70	11.55	.....	.....
	2 1/4"	Standard.....	\$8.70	\$ 9.05	\$ 9.20	\$ 9.70	\$10.30	\$10.75	\$11.65	\$13.35	\$15.70	\$18.25
		Wick-Oiling.....	9.25	9.60	9.75	10.25	10.85	11.30	12.20	13.90	16.25	18.80
		Capillary.....	10.70	11.05	11.20	11.70	12.30	12.75	13.65	15.35	17.70	20.25
G	2 1/2"	Standard.....	\$ 9.35	\$ 9.70	\$ 9.85	\$10.35	\$10.95	\$11.40	\$12.30	\$14.00	\$16.35	\$18.90
		Wick-Oiling.....	10.05	10.40	10.55	11.05	11.65	12.10	13.00	14.70	17.05	19.60
		Capillary.....	11.30	11.65	11.80	12.30	12.90	13.35	14.25	15.95	18.30	20.85
	3"	Standard.....	\$10.85	\$11.35	\$11.85	\$12.35	\$13.35	\$14.45	\$15.50	\$17.75	\$19.80	\$20.55
		Wick-Oiling.....	11.65	12.15	12.65	13.15	14.15	15.25	16.30	18.55	20.60	21.35
		Capillary.....	13.45	13.95	14.45	14.95	15.95	17.05	18.10	20.35	22.40	23.15
K	3 1/4"	Standard.....	\$12.80	\$13.30	\$13.80	\$14.30	\$15.30	\$16.40	\$17.45	\$19.70	\$21.75	\$22.50
		Wick-Oiling.....	13.95	14.45	14.95	15.45	16.45	17.55	18.60	20.85	22.90	23.65
		Capillary.....	16.20	16.70	17.20	17.70	18.70	19.80	20.85	23.10	25.15	25.90
	3 1/2"	Standard.....	.....	\$16.40	\$16.95	\$17.70	\$18.20	\$19.60	\$21.50	\$24.70	\$27.80	\$30.30
		Wick-Oiling.....	.....	17.80	18.35	19.10	19.61	21.00	22.90	26.10	29.20	31.70
		Capillary.....	.....	24.70	25.25	26.00	26.50	27.90	29.80	33.00	36.10	38.60
M	3 3/4"	Standard.....	.....	25.10	25.65	26.40	26.90	28.30	30.20	33.40	36.50	39.00
		Wick-Oiling.....	.....	27.55	28.10	28.85	29.35	30.75	32.65	35.85	38.95	41.45
		Capillary.....	.....	31.00	32.55	33.05	35.20	35.95	37.85	43.10	46.55	51.10
	4"	Standard.....	.....	\$26.10	\$26.65	\$27.15	\$29.30	\$30.05	\$31.95	\$37.20	\$40.65	\$45.20
		Wick-Oiling.....	.....	32.20	33.75	34.25	36.40	37.15	39.05	44.30	47.75	52.30
		Capillary.....	.....	32.80	34.35	34.85	37.00	37.75	39.65	44.90	48.35	52.90

NOTE—For larger sizes prices on application.

To obtain price of frame only, without bearing, deduct price of bearing on Page 440.

DODGE BEARINGS

FOR BALL AND SOCKET DROP, POST, BRACKET AND SHORT DROP HEAD SHAFT HANGERS

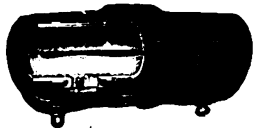


FIG. 1486
CAPILLARY-OILING

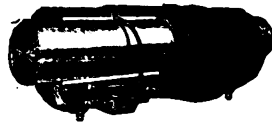


FIG. 1487
RING-OILING



FIG. 1488
STANDARD OR PLAIN



FIG. 1489
WICK-OILING

STANDARD

This plain oiling type of bearing is exceptionally well made, and is relatively inexpensive. It is lubricated by means of waste saturated with oil, placed in the cups cast in the cap. It is largely used in saw mills and other similar plants where the refinements of the other types of bearings do not seem to be so necessary to the users, as in the case of plants devoted to the manufacture of a finer and more finished class of material. It is also used to a considerable extent in certain elevating and conveying work, and in places where there is considerable dust and grit to contend with, the caps of the bearings in this case being usually tapped for and fitted with Compression Grease Cups. The babbitt in the bearing is bored and reamed out to shaft size.

CAPILLARY

The Dodge Patent Capillary Oiler is a wooden block, with alternate saw cuts through which the oil rises by capillary attraction from the reservoir to the shaft. The law of capillary attraction is definite and positive, and can be always relied upon absolutely. The capillary oiler is self acting, and takes care of itself. Once in six months drain off the old oil from the reservoir and clean the bearing; then refill the reservoir with new oil, and the bearing will do its work, day after day without any further attention.

RING

The use of rings, driven by the friction of their own weight upon the shaft, for bringing up on the shaft a continuous supply of oil, is a method of lubrication which is quite old, and which has become generally recognized as very efficient and satisfactory.

In the Dodge Ring Oiling Hanger Bearing, this method of lubrication is employed in connection with a bearing of decidedly superior design, construction and finish. The bearings are practically five times as long as the diameter of the shaft for which they are made. The liberal bearing areas reduce the pressures per square inch much below that which must be carried by bearings of shorter lengths. With every bearing the most important thing is to maintain a definite and absolute film of oil between the shaft and the babbitt. In other words the shaft must be practically floated on a film of oil. The lighter the pressure per square inch on the projected area of the bearing the greater the ease with which the oil can be maintained between the shaft and the babbitt, with consequent reduction of the frictional loss. There is a liberal oil reservoir, and a replenishment of the oil about once in six months is all that is necessary. The babbitt is of a high quality, which is bored and reamed out to size.

PRICE LIST OF BEARINGS ONLY

Shaft Size, Inches	Standard	Capillary	Ring
$\frac{1}{8}$ and 1	\$ 0.80	\$ 1.75	not made
$\frac{1}{4}$ and $1\frac{1}{4}$	.90	1.90	\$ 2.10
$\frac{1}{2}$ and $1\frac{1}{2}$	1.45	2.25	2.45
$\frac{3}{4}$ and $1\frac{3}{4}$	1.55	2.50	2.70
$1\frac{1}{8}$ and 2	2.15	4.05	4.30
$2\frac{1}{8}$ and $2\frac{1}{4}$	2.70	4.70	4.95
$2\frac{3}{8}$ and $2\frac{1}{2}$	3.35	5.30	5.60
$2\frac{7}{8}$ and $2\frac{3}{4}$	3.95	6.55	6.90
$3\frac{1}{8}$ and 3	5.90	9.30	9.65
$3\frac{3}{8}$ and $3\frac{1}{4}$	6.55	14.85	15.25
$3\frac{7}{8}$ and $3\frac{1}{2}$	7.00	17.20	17.70
$3\frac{11}{8}$ and $3\frac{3}{4}$	10.25	18.85	19.40
$3\frac{1}{2}$ and 4	13.50	20.60	21.20
$4\frac{1}{8}$ and $4\frac{1}{4}$	14.65	not made	22.10
$4\frac{1}{2}$ and $4\frac{1}{2}$	15.90	"	24.85
$4\frac{3}{4}$ and $4\frac{3}{4}$	19.00	"	30.25
$4\frac{7}{8}$ and 5	22.05	"	35.40

Note:—The prices on above bearings only, when added to the separate prices of frames, exactly equal the prices of complete hangers.

The short drop head shaft hanger and the adjustable pillow block referred to on Page 436 are identically the same, the bearings being simply inverted. The price list above, therefore, also covers the cost of the bearings only for the adjustable pillow block.

WICK OILING

Is much the same in appearance as the plain bearing except that it has an oil-reservoir on top, from which and by means of a wick, the shaft is lubricated the entire length of bearing; capillary attraction being the principle.

All of the bearings proper shown are interchangeable between the frames for Dodge hangers, post hangers, bracket hangers and short drop head shaft hangers.

All these frames have a letter or symbol plainly cast upon same, which is intended to indicate the size of bearing which properly goes in such frame. This is explained as follows:

Frames lettered	B	take all bearings for	$\frac{1}{8}$ to $1\frac{1}{4}$ inch shaft
"	"	D	" " " " $1\frac{1}{8}$ " $1\frac{1}{4}$ " "
"	"	E	" " " " $1\frac{1}{8}$ " 2 " "
"	"	G	" " " " $2\frac{1}{8}$ " $2\frac{1}{2}$ " "
"	"	K	" " " " $2\frac{1}{8}$ " 3 " "
"	"	M	" " " " $3\frac{1}{8}$ " $3\frac{1}{8}$ " "
"	"	O	" " " " $3\frac{1}{8}$ " 4 " "
"	"	R	" " " " $4\frac{1}{8}$ " $4\frac{1}{2}$ " "
"	"	T	" " " " $4\frac{1}{8}$ " 5 " "
"	"	W	" " " " $5\frac{1}{8}$ " 6 " "

This system of interchangeability of bearings in the different frames, and that one size of frame will take two or more different sizes of bearings, are features of great advantage.

HYATT FLEXIBLE ROLLER BEARINGS

FOR LINE SHAFTING

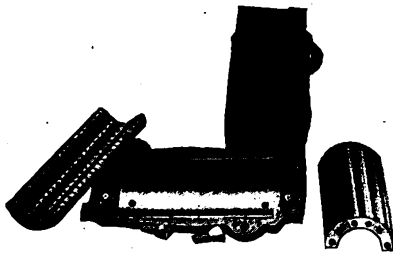


FIG. 1481



FIG. 1483

(1) Flexible rollers insure full line contact—an even distribution of load over the entire bearing surface—permitting direct-on-shaft operation.

(2) Hollow rollers are natural oil reservoirs, able to take liberal charge of lubricant at a time—this means long intervals between oiling.

(3) Rollers are assembled right and left-hand spirals, insuring an automatic and reliable circulation of oil.

(4) Oil wipers on each end of boxes prevent oil from running along shafting.

(5) Split to facilitate erection; can be mounted on erected shaft without taking same down or removing couplings, pulleys or clutches.

(6) Oil hole fitted with self-closing cap, easily accessible. One-half pint when starting is sufficient to operate a 1½" bearing four to five months without further attention.

HYATT STANDARD BOXES ONLY (NO FRAMES)

The following list prices are for boxes only, suitable for ball and socket (B & S) or universal giant (U. G.) frames.

Diam. of shaft, inches	1½	1½	1½	2½	2½	2½	2½	3½	3½	3½	3½	4½	4½	5½	5½
List Price	\$11.35	12.85	15.50	18.00	22.40	26.85	31.70	37.25	83.70	109.25	135.75	158.90	190.40	281.25	390.00

DROP HANGER FRAMES

WITH HYATT FLEXIBLE ROLLER BEARINGS FOR LINE SHAFTS

FOR SPEED UP TO 600 REVOLUTIONS

FOR STYLE OF HANGER SEE PAGE 439

Symbol	Diam. Shaft Inches	Drop in Inches									
		8	10	12	14	16	18	20	24	30	36
G	1½	\$15.65	\$16.00	\$16.15	\$16.65	\$17.25	\$17.70	\$18.65	\$20.30	\$23.50	\$25.20
G	1½	17.50	17.85	18.00	18.50	19.00	19.55	20.45	22.15	25.35	26.15
K	1½	20.60	21.10	21.60	22.10	23.10	24.20	25.25	27.50	29.55	30.30
K	2½	24.90	25.40	25.90	26.45	27.40	28.50	29.55	31.80	33.05	34.75
M	2½	.....	32.25	32.85	33.55	34.05	35.45	37.55	40.55	43.65	46.15
O	2½	.....	38.50	40.00	40.50	42.75	43.50	45.30	50.55	not	58.75
O	2½	.....	43.30	44.85	45.50	47.50	48.50	50.25	55.50	made	63.50
R	3½	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....

Larger sizes on application.

THE FOLLOWING SIZES FURNISHED ONLY IN FOUR POINT TYPE

FOR SPEED UP TO 400 REVOLUTIONS

Diam. Shaft Inches	Drop in Inches										
	6-8	9-11	12-14	15-17	18-20	21-23	24-26	27-29	30-32	33-35	36-38
3½	\$ 86.50	\$ 88.10	\$ 89.75	\$ 92.80	\$ 96.00	\$ 99.00	\$102.65	\$107.35	\$112.00	\$116.75	\$122.00
3¾	113.00	114.60	116.15	119.30	122.45	125.60	129.15	133.85	138.55	143.25	148.00
4	.....	163.25	166.30	169.45	174.15	178.85	184.15	188.30	193.00	197.70	202.50
4½	.....	.....	220.75	223.15	227.85	234.10	238.80	243.50	248.25	253.00	258.00
4¾	.....	.....	250.00	256.35	262.75	269.00	275.40	281.55	287.75	294.00	300.50

List of intermediate diameter shafts given on application.

Even inches and their fractions take list of nearest sixteenth.

SEE FOLLOWING PAGE

HYATT FLEXIBLE ROLLER BEARINGS

FOR LINE SHAFTING

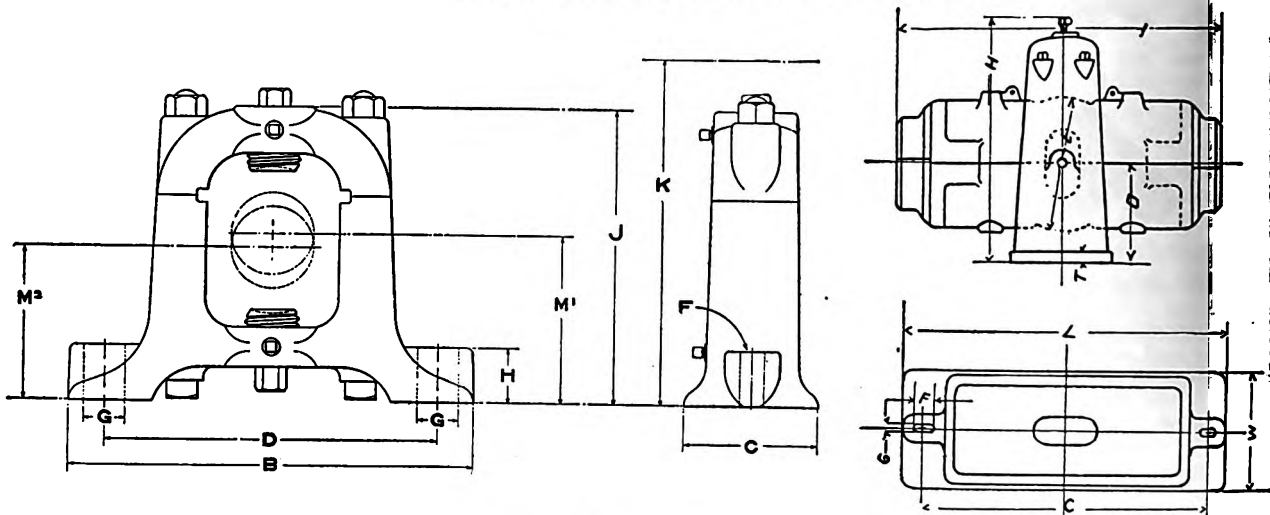
ADJUSTABLE PILLOW BLOCK FRAMES

FITTED WITH HYATT SPIRAL ROLLER BEARINGS FOR LINE SHAFTS

3/16 INCH BEARINGS AND UNDER, SUITABLE FOR 600 REVOLUTIONS—LARGER SIZES SUITABLE FOR 400 REVOLUTIONS.

SPECIAL QUOTATIONS FOR HIGHER SPEEDS

DIMENSIONS OF ADJUSTABLE PILLOW BLOCK OR SHORT DROP HANGER



FOR SHAFTING UP TO AND INCLUDING 3/16 INCH SIZE
FIG. 1484

FOR SHAFTING 3/16 AND OVER
FIG. 1485

Shaft Sizes and Symbol	B	C	D	Bolts F	G	H	K	J	M1	M2
1 7/16-1 1/2 G	13	4 1/4	10 3/4	3/4	1 1/4	1 5/8	14	9 5/8	5 1/2	5
1 1/2-2 1/4 K	14 3/4	4 7/8	13 3/8	7/8	1 1/2	2	15	10 3/4	6 1/8	5 5/8
2 1/4-2 3/4 M	16 3/4	5 1/2	13 3/4	1	1 3/4	2 1/2	17 1/2	12 1/2	7	6 1/4
2 3/4-3 1/8 O	18 1/2	6	15 1/4	1 1/8	2	2 3/4	18 1/2	13 1/8	7 1/2	6 3/4
3 1/8 R	21	6 3/4	17 1/4	1 1/2	2 1/8	3	20 1/2	14 3/8	8 1/4	7 1/2

Diam. of Shaft Inch	Dimensions										
	L	W	T	H	D	C	E	F	G	I	J
3 7/16	17 1/4	6	1 1/2	13	5 15/16	14	7 1/2	1 1/4	3/4	17 1/4	3 1/2
3 1/8	24 1/2	9	2	18 1/2	7 5/8	19 1/2	10 3/4	2 1/4	1 1/4	20	5
4 7/16	24 1/2	9	2	18 1/2	7 5/8	19 1/2	10 3/4	2 1/4	1 1/4	22 1/4	5 1/2
4 1/8	24 1/2	9	2	18 1/2	7 5/8	19 1/2	10 3/4	2 1/4	1 1/4	24 1/4	5 1/2
5 7/16	28 1/2	10 1/2	2 1/8	21	8 1/8	23	12 1/4	2 5/8	1 1/2	24 1/4	6
5 1/8	32 1/2	10 1/2	2 1/4	22	8 3/4	27	13 3/8	2 5/8	1 1/2	30	6

Note:—M1 when used as pillow block; M2 as short drop head shaft hanger; K, distance to remove cap.

PRICE LIST ADJ. PILLOW BLOCK FRAMES, WITH HYATT ROLLER BEARINGS

For illustrations of frame sizes up to 2 1/4, see page 436

Sizes 3 1/8 and larger not illustrated

Diameter Shaft Inches	Symbol	List Price	Diameter of Shaft Inches	List Price
1 7/16	G	\$15.65	3 7/16	\$ 74.80
1 1/2	G	17.50	3 1/8	148.70
1 1/4	K	23.25	4 7/16	188.90
2 1/4	K	27.55	4 1/8	240.40
2 3/8	M	35.40	5 7/16	356.25
2 1/2	O	43.35	5 1/8	490.00
2 1/8	O	48.20		

Even inches and their fractions take list of nearest sixteenth plus 10% in sizes up to and including 3 1/8 inches. Above that list is the same.

LARGER SIZES UPON APPLICATION

POST HANGERS

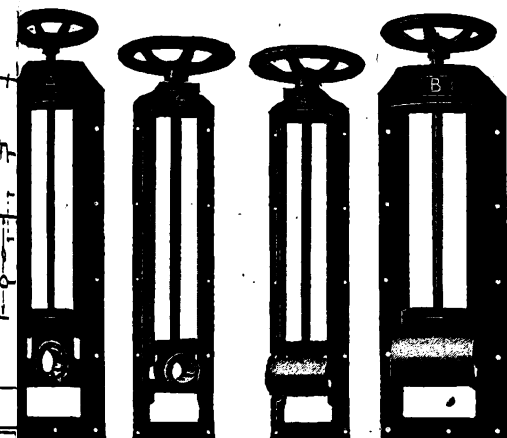
ADJUSTABLE BALL AND SOCKET WITH HYATT SPIRAL ROLLER BEARINGS FOR LINE SHAFT
FOR STYLE OF HANGER SEE PAGE 438

Symbol	Diam. Shaft Inches	List Price	Symbol	Diam. Shaft Inches	List Price
G	1 7/16	\$16.75	K	2 3/8	\$27.05
G	1 1/2	18.55	M	2 1/8	34.85
K	1 1/4	22.75	O	2 1/2	42.05
			O	2 1/8	46.90

LARGER SIZES UPON APPLICATION

DODGE STANDARD TAKE-UPS

BEARINGS ARE OF SOLID TYPE, BABBITTED AND BORED TO FIT SHAFT
FOR USE WHEN IT IS NECESSARY TO TAKE UP SLACK IN BELTS, AS IN ELEVATORS. MADE TO PULL AND PUSH



HEAVY LIGHT LIGHT HEAVY
STYLE A FIG. 1503 STYLE B

Shaft Size, Inches	LIGHT		HEAVY	
	12 Inch Adjust- ment	18-Inch Adjust- ment	16-Inch Adjust- ment	28-Inch Adjust- ment
$1\frac{1}{8}$	\$4.50	\$4.85	.....	.....
$1\frac{3}{8}$	4.65	5.00	.....	.....
$1\frac{1}{2}$	4.80	5.15	.....	.....
$1\frac{7}{8}$	5.00	5.35	.....	.....
$1\frac{3}{4}$	5.20	5.55	\$14.70	\$17.00
$2\frac{1}{8}$	....	....	15.30	17.55
$2\frac{1}{4}$	....	....	16.10	18.35
$2\frac{3}{8}$	....	....	16.75	19.20
$2\frac{1}{2}$	....	....	17.55	19.50

Prices above are for one takeup only, not per pair.

DODGE CLASS "A" VERTICAL BELT TIGHTENER

IRON FRAME

These belt tighteners are intended for very severe service, especially the larger sizes which were designed primarily for use on heavy duty engine drives where it is necessary to tighten the belt considerably to obtain the required working tension.

They are very strong and massive, and have a base area of sufficient size to insure perfect rigidity on the frame.

The bearings are ring-oiling of the spherical ball and socket type (thus giving adjustment to either side) and large enough to come well under safe bearing pressure limits.

These tighteners are also built up with the adjustment working on the vertical side of frame. The hand wheel may be placed at the bottom if so desired.

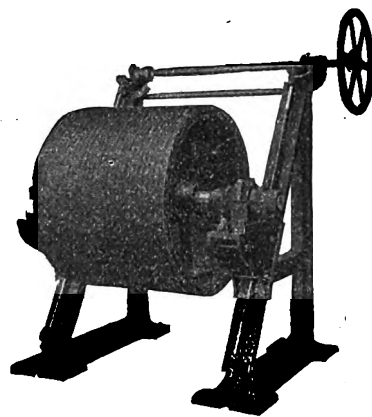


FIG. 1504

DODGE CLASS "B" BELT TIGHTENER

IRON FRAME

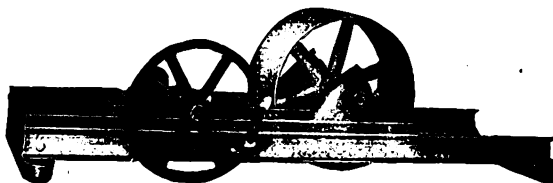


FIG. 1505

The Dodge Class "B" Belt Tightener is used most commonly for vertical belt drives and is so made (with a combination steel and iron frame), that when setting on the floor it makes a very rigid and efficient device for taking up the slack and maintaining the necessary tension on the belt.

The bearings are ring-oiling, of a true ball and socket type, and are carried in the pulley frame, that is cast in one piece with track on either side; whereby the adjustment is obtained by means of the pinions on the hand wheel shaft.

These tighteners are neat in design and well made, embodying all the essential features needed for this class of work.

The pulleys furnished on these tighteners are regularly balanced for a speed of 400 R. P. M. If a higher speed is required, an extra charge will be made for the special balance.

RIVETED CHAINS

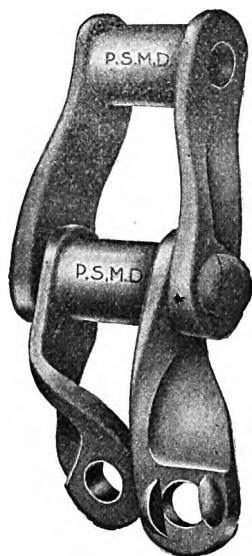


FIG. 1506

P.S.M.D. Riveted chains have been designed to meet the requirements of the Pacific Coast Mills.

The links are made of the best quality refined malleable iron. (Note how it is possible to twist them without fracture). Each section of chain is tested to its full rated capacity on an improved testing machine.

These riveted chains all have the large T head cold rolled steel rivets, which are held perfectly rigid by the jaws on the side bar. The rivet is practically a solid part of the link.

It is a well known fact that the wear, elongation of pitch and failure of the ordinary riveted chain is caused by the rotating or rocking of the rivet, which allows it to wear through the thin open ends of the link.

These riveted chains are made with extra heavy barrels, which materially increases the life of the chain. It goes without saying that the larger the barrel the longer the life of the chain when other members of the link are in correct proportion.

The secret of the success of the -P.S.M.D. Riveted Chains lies in the combining of these important features into one body, with the result that we are able to offer you a chain which we can stand behind with the strongest kind of a guarantee.

NOTE—We are prepared to furnish these chains made up with any standard attachments spaced as desired.

RIVETED SAW MILL CHAINS

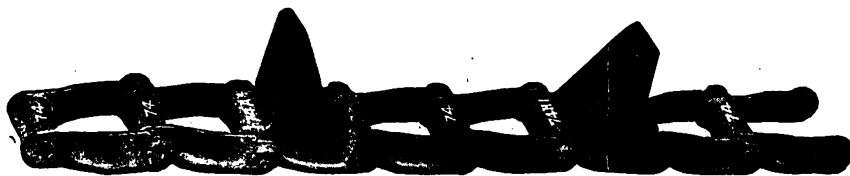


FIG. 1507

NO. 74 CHAIN WITH A AND H1 ATTACHMENTS.

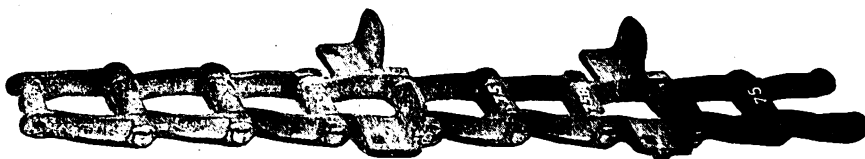


FIG. 1508

NO. 75 CHAIN WITH B ATTACHMENTS.



FIG. 1509

NO. 78 CHAIN WITH NR AND NL ATTACHMENT ALTERNATING.



FIG. 1510

NO. 82 CHAIN WITH NN ATTACHMENTS.

RIVETED SAW MILL CHAINS



FIG. 1519
NO. 87 CHAIN WITH F2 ATTACHMENTS.

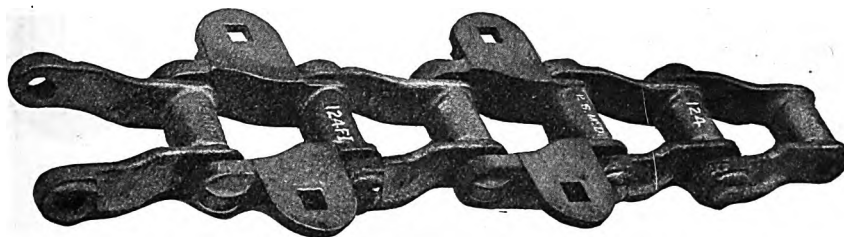


FIG. 1520
NO. 124 CHAIN WITH F1 ATTACHMENTS.

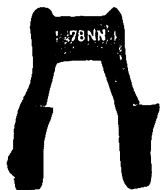
NOTE—We are prepared to furnish these chains made up with any standard attachment, spaced as desired.

P. S. M. D. ATTACHMENTS

All Standard Styles of Attachments can be furnished.



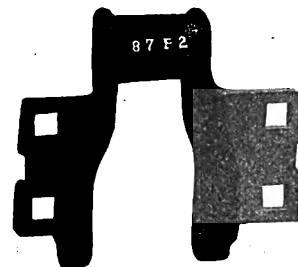
NR—FIG. 1521



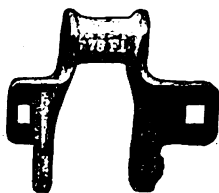
NN—FIG. 1522



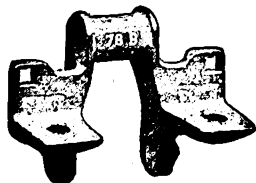
NL—FIG. 1523



F2—FIG. 1524



F1—FIG. 1525



B—FIG. 1526



A—FIG. 1527



H1—FIG. 1528

PRICE LIST OF RIVETED DRIVE CHAINS

Size	Price Per Foot.										
	60	62	73	74	75	78	82	87	95	108	124
Plain	\$.38	\$.38	\$.53	\$.41	\$.38	\$.56	\$.75	\$.98	\$.68	\$.75	\$1.13
A	.60	.....	.75	*.68	.60	*.90	*1.05	1.28	1.05	.....	1.50
B	.68	.....	.98	*.83	*.60	*.98	*1.13	*1.35	1.13	1.20	*1.50
F1	.53	.....	.68	*.53	*.53	.75	.98	1.20	.....	.....	*1.50
F2	.....	.....	.....	.....	.....	.....	*1.05	*1.28	.90	1.05	1.50
H1	.....	.....	.....	*.68	.....	*.90	.....	2.55	.....	.....	.....
NN	.53	.53	.68	*.53	.45	*.68	*.90	.....	.....	1.05	1.35
NR	.53	.....	.68	*.53	.45	*.68	.90	.....	.....	.....	.....
NL	.53	.....	.68	*.53	.45	*.68	.90	.....	.....	.....	.....
Rivets Per 100	\$1.50	1.40	\$2.70	\$2.70	\$1.80	\$3.50	\$5.60	\$7.60	\$4.25	\$8.00	\$20.00

* Indicates stock sizes.

TABLE OF DIMENSIONS AND STRENGTHS OF RIVETED DRIVE CHAINS

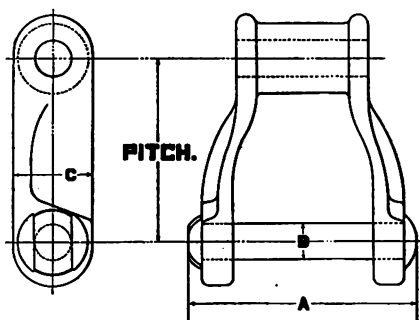


FIG. 1515

Size	Approximate Links in 10 ft.	Average Pitch of Standard Chain in Inches	A Inches	B Dia. Rivet, Inches	Length of Rivet Under Head, Inches	C Inches	Average Ultimate Strength Pounds	Approximate wt. per 10 ft.
60	52	2.307	2 1/2	1 1/8	2 9/16	3/4	7,000	20.1
62	73	1.643	2 1/4	1 1/8	2 9/16	3/4	7,000	23.8
73	51	2.353	3 1/8	1 1/8	2 13/16	1 1/8	14,000	40.8
*74	46	2.609	2 1/2	1 1/8	2 5/8	1	10,000	27.9
*75	46	2.609	2 3/4	1 1/8	2 11/16	3/4	7,000	20.9
*78	46	2.609	3 3/8	1 1/2	3	1 1/8	16,000	41.8
*82	39	3.075	3 1/2	1 1/8	3 7/16	1 1/4	21,000	56.2
*87	30	4.000	4 1/4	1 5/8	4	1 3/8	23,000	69.6
95	30	4.000	4	1 1/2	4 1/8	1 1/4	16,000	50.8
108	25 1/2	4.720	5	1 7/8	5 1/8	1 1/4	21,000	58.1
*124	30	4.000	4 3/4	1 3/4	4 7/16	1 1/8	30,000	84.4

* Indicates stock sizes.

RIVETED TRANSFER CHAIN



FIG. 1516

NO. 130. BEVEL TOP TRANSFER CHAIN



FIG. 1517

NO. 131. BEVEL TOP TRANSFER CHAIN



FIG. 1518

NO. 131 1/2. BEVEL TOP TRANSFER CHAIN

Sprockets for this chain shown on page 421.

Size	Price per Foot	Rivets per 100	Average Ultimate Strength	Pitch	Diam. Rivets	Width Over All	Height at Side	Height Over All	Weight per 10 ft. Lbs.
130	\$.90	\$3.50	14,000 lbs.	3 7/8	1 1/2	3 1/4	1 1/8	1 5/8	48.2
131	.98	3.50	15,000 lbs.	4	1 1/2	3 1/4	1 1/8	1 5/8	50.0
131 1/2	1.28	7.60	23,000 lbs.	4	1 5/8	3 3/4	1 9/16	2 1/4	85.5

NOTE—Riveted Transfer Chains as made by different manufacturers vary in designations and dimensions. Carefully check with this catalogue the dimensions desired and order by the number corresponding to your requirements.

No. 130 is 3 7/8-inch pitch, while some other makes designated as No. 130 are 4-inch pitch. P.S.M.D.—4-inch pitch is known as No. 131. The heavy type of Bevel Top—P.S.M.D.—Transfer Chain is No. 131 1/2, while some manufacturers designate this type as No. 131.

RIVETED SAW DUST CHAINS

These chains can be furnished with every link fitted with an attachment, or alternating links, or as far apart as desired. With plain links they are known as No. 104 or No. 110; with attachments on every link as No. 104-C or No. 110-C, and with attachments on alternating links (as shown on No. 104), they are distinguished as No. 104 & C or No. 110 & C. Other sizes can be furnished with "C" attachments.

NOTE—Attachment links are 5 inches wider than plain links.

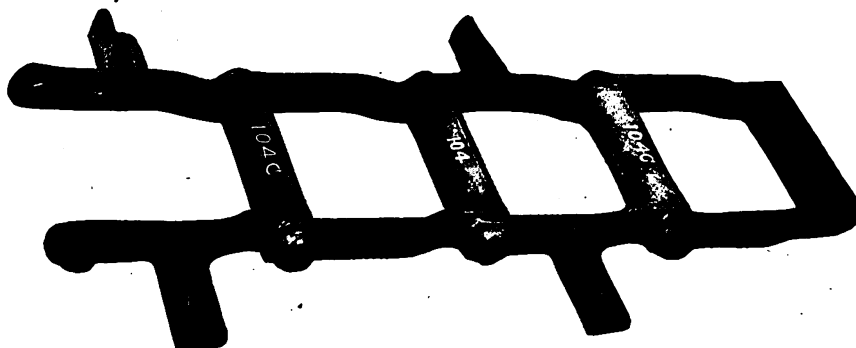


FIG. 1511

NO. 104 RIVETED SAW DUST CHAIN, SHOWING THE "C" OR "WING" ATTACHMENT.

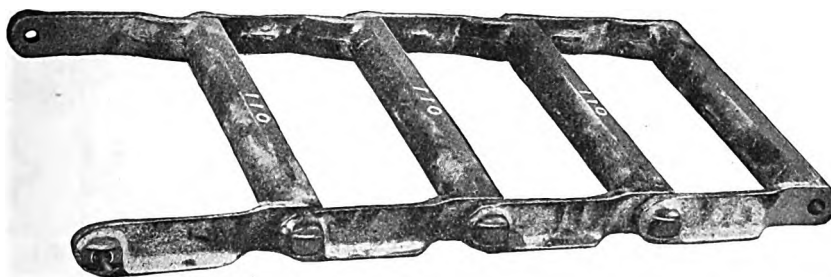


FIG. 1512

NO. 110 RIVETED SAW DUST CHAIN, PLAIN.

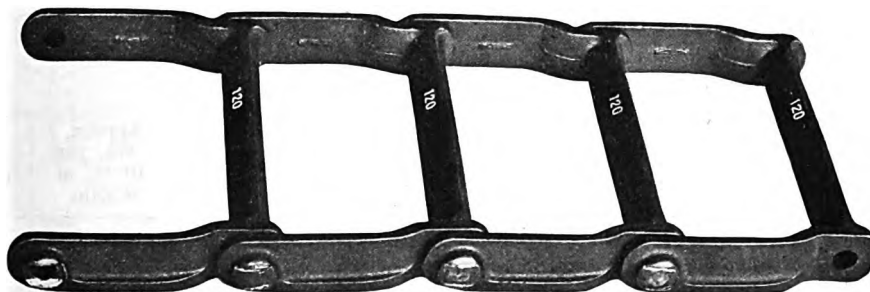


FIG. 1513

NO. 120 RIVETED SAW DUST CHAIN, PLAIN.

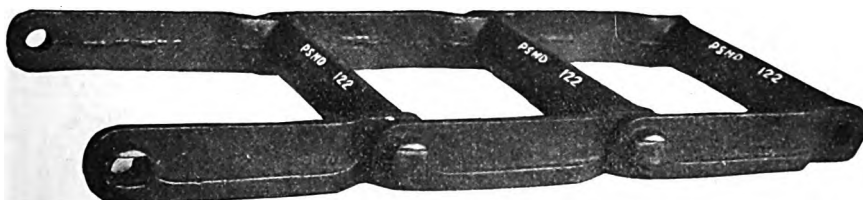


FIG. 1514

NO. 122 RIVETED SAW DUST CHAIN, PLAIN.

SEE OUR LINES OF GENERAL MACHINERY, PAGES 800 TO 899

RIVETED SAW DUST CHAINS

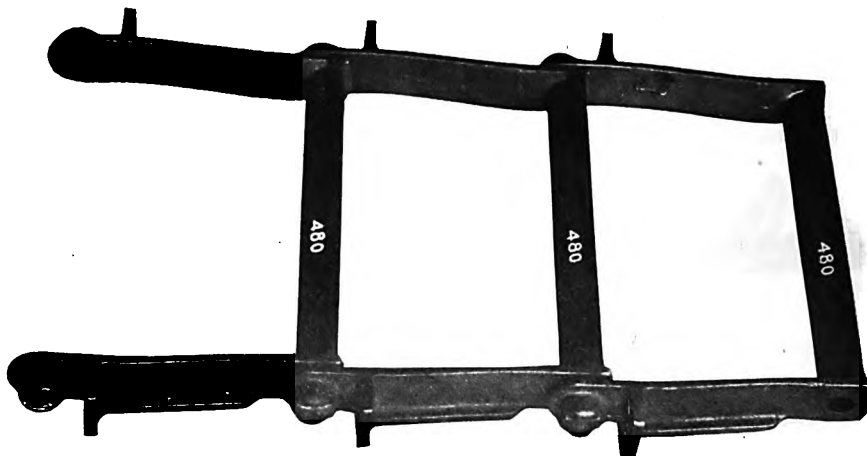


FIG. 1529
NO. 480 RIVETED SAW DUST CHAIN, PLAIN

TABLE OF DIMENSIONS, STRENGTH AND PRICE LIST OF RIVETED SAWDUST CHAINS

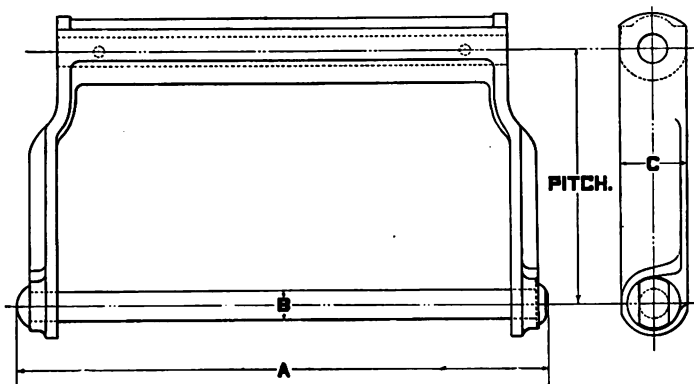


FIG. 1530

Size	Pitch Inches	Width of Link A	Height of Link C	Diam. of Rivet B	Average Ultimate Strength	Width of Sprocket	Approx. Wt. per 10 ft. of Chain	Price per foot	Price of Rivets per 100
97	5	5	1 $\frac{3}{8}$	$\frac{1}{8}$	24,000	3 $\frac{3}{8}$	66.0	\$.83	\$12.50
98	5	7	1 $\frac{1}{2}$	$\frac{5}{8}$	24,000	4 $\frac{1}{4}$	81.6	.98	22.50
100	5	9	1 $\frac{3}{8}$	$\frac{1}{8}$	24,000	6 $\frac{1}{4}$	82.4	.98	22.50
*102	5	9	1 $\frac{1}{2}$	$\frac{5}{8}$	25,000	6 $\frac{1}{4}$	91.3	1.13	25.00
*102C	5	14	1 $\frac{1}{2}$	$\frac{5}{8}$	25,000	6 $\frac{1}{4}$	.....	1.35	25.00
*102 & C	5	14	1 $\frac{1}{2}$	$\frac{5}{8}$	25,000	6 $\frac{1}{4}$	.....	1.24	25.00
*104	6	7	1 $\frac{1}{2}$	$\frac{5}{8}$	25,000	4 $\frac{3}{8}$	74.1	.98	20.00
*104C	6	12	1 $\frac{1}{2}$	$\frac{5}{8}$	25,000	4 $\frac{3}{8}$	94.6	1.20	20.00
*104 & C	6	12	1 $\frac{1}{2}$	$\frac{5}{8}$	25,000	4 $\frac{3}{8}$	80.1	1.09	20.00
106	6	10	1 $\frac{5}{8}$	$\frac{5}{8}$	25,000	7	.....	1.43	25.00
*110	6	12	1 $\frac{5}{8}$	$\frac{5}{8}$	25,000	9 $\frac{1}{2}$	125.1	1.50	28.00
*110C	6	17 $\frac{1}{2}$	1 $\frac{5}{8}$	$\frac{5}{8}$	25,000	9 $\frac{1}{2}$	.....	1.80	28.00
*110 & C	6	17 $\frac{1}{2}$	1 $\frac{5}{8}$	$\frac{5}{8}$	25,000	9 $\frac{1}{2}$	.....	1.65	28.00
112	8	12	1 $\frac{1}{2}$	$\frac{5}{8}$	25,000	10	90.0	1.35	28.00
113	6	12	1 $\frac{5}{8}$	$\frac{5}{8}$	30,000	10	.....	1.80	28.00
116	8	16	1 $\frac{5}{8}$	$\frac{5}{8}$	25,000	13	146.5	1.80	38.00
118	8	19	2 $\frac{1}{4}$	$\frac{3}{4}$	40,000	13	207	2.55	48.00
*120	6	12	2	$\frac{3}{4}$	40,000	9	170	2.55	38.00
*122	8	12	2	$\frac{3}{4}$	40,000	9	130	2.25	38.00
*480	8	16	2	$\frac{3}{4}$	40,000	11	151.5	2.25	46.00

* Indicates stock size.

DETACHABLE LINK BELT ATTACHMENTS

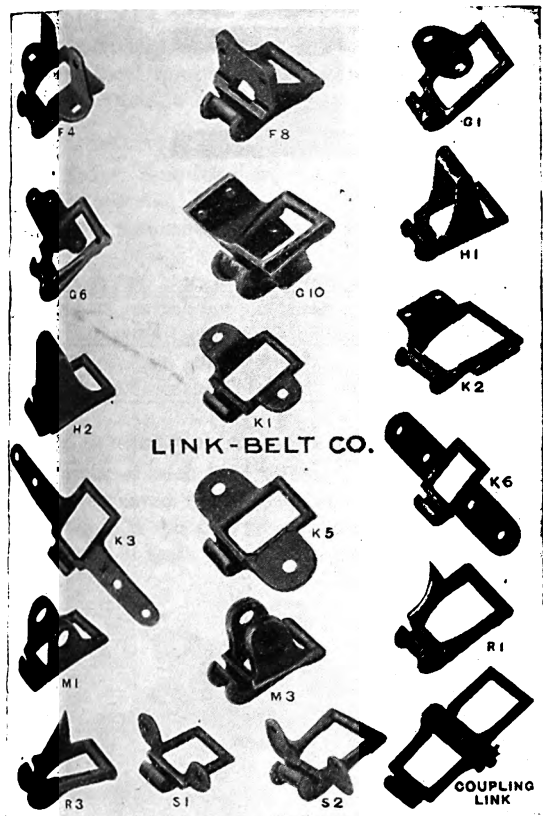


FIG. 1631

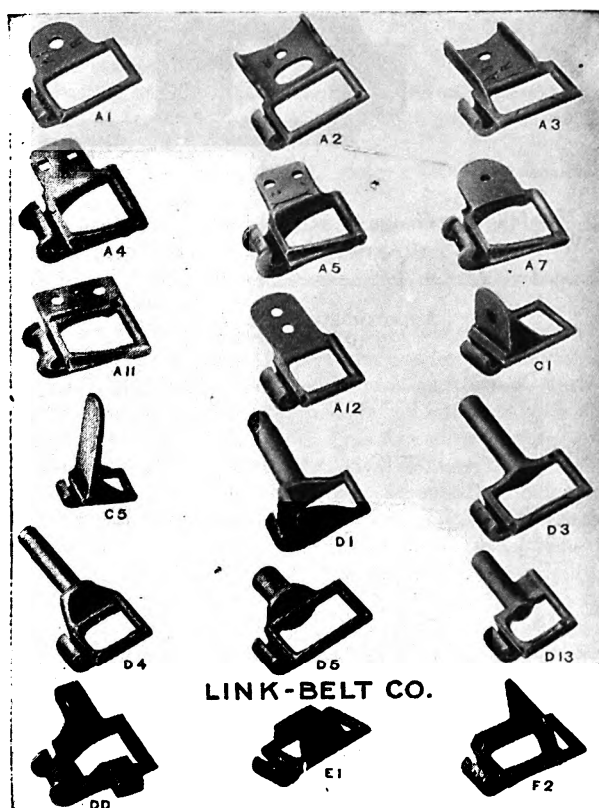


FIG. 1632

No. 25		No. 34		No. 52		No. 62		No. 77		No. 88	
Style	Price, per Ft.	Style	Price, per Ft.	Style	Price, per Ft.	Style	Price, per Ft.	Style	Price, per Ft.	Style	Price, per Ft.
A-1	\$.27	A-1	\$.27	A-1	\$.35	A-1	\$.40	A-1	\$.46	A-1	\$.85
A-3	.28	C-1	.41	A-3	.42	A-2	.41	A-12	.68	A-3	.85
C-1	.36	C-2	.46	C-1	.41	A-3	.42	D-5	.52	A-7	.77
C-5	.63	D-44	.35	D-5	.55	D-5	.55	E-1	.47	C-1	.94
D-3	.32	E-1	.30	E-1	.41	F-2	.33	F-2	.79	D-5	.82
E-1	.27	K-1	.36	F-2	.53	G-1	.57	G-1	.59	E-1	.79
G-1	.35	No. 35		G-1	.40	K-1	.43	G-6	.63	F-2	.97
H-2	.35	A-1	\$.29	K-1	.43	K-5	.41	H-1	.59	F-4	.87
K-1	.32	A-2	.40	R-19	.31	No. 67		K-1	.52	FF	.92
K-5	.29	D-9	.43	No. 55		K-2	.59	R-1	.40	G-1	.81
K-6	.36	E-1	.31	A-1	.31	A-1	\$.40	R-3	.44	G-6	.90
M-1	.33	E-31	.84	A-2	.40	D-5	.53	S-2	.48	G-19	.99
No. 32		K-1	.40	C-1	.39	E-1	.46	No. 78		H-1	.93
A-1	\$.30	No. 42		D-3	.65	F-2	.59	No. 103		H-2	.95
A-3	.27	A-1	\$.29	E-1	.31	FF	.60			K-1	.75
C-1	.40	A-3	.43	F-2	.43	G-1	.61			R-1	.63
D-3	.33	D-2	.38	G-2	.25	H-1	.61			S-2	.76
E-1	.27	E-1	.27	K-1	.35	K-1	.49	A-3	\$.72	A-1	\$1.12
G-1	.31	G-27	.49	K-5	.37	K-3	.65	A-7	.68	A-3	1.25
K-1	.37	K-3	.50	M-5	.68	No. 75		A-23	.71	A-11	1.12
K-3	.48	M-2	.52	No. 57		A-23	\$.72	D-1	.80	D-5	1.25
M-1	.40	No. 45		A-1	\$.37	C-4	.36	F-2	.68	E-1	1.15
No. 33		A-1	\$.25	A-3	.41	E-1	.44	G-6	.83	F-2	1.36
A-1	\$.21	A-3	.35	C-1	.37	H-1	.55	G-19	.81	G-6	1.38
A-6	.28	D-5	.40	C-4	.27	H-2	.55	H-1	.81	G-19	1.32
D-3	.48	E-1	.27	D-5	.46	K-1	.48	H-2	.81	H-2	1.25
E-1	.22	G-1	.29	E-1	.33	M-3	.80	K-1	.68	K-1	1.16
H-2	.32	H-2	.43	F-2	.53	R-1	.36	K-3	.81	K-2	1.20
K-1	.31	K-1	.32	H-2	.54	R-2	.36	M-3	.85	R-1	1.01
K-5	.31	M-1	.31	K-1	.43	R-8	.42	R-1	.52	R-3	1.10
M-1	.36			S-2	.40	R-50	.57	S-2	.04		

DETACHABLE CHAIN OR LINK-BELT



FIG. 1533

STANDARD SIZES

The following chains are accepted standards for general industrial work.
We can supply all sizes and can also furnish promptly Sprocket Wheels to suit.

No.	Approximate Links in 10 Feet	Average Pitch of Standard Chain Inches	Average Ultimate Strength Pounds	Price	
				Plain Chain per Foot	Couplers per Pair
25	133	.902	700	\$.15	\$.15
32	104	1.154	1100	.15	.18
33	86	1.394	1190	.15	.17
34	86	1.398	1300	.15	.17
35	74	1.630	1200	.15	.20
42	88	1.375	1500	.17	.21
45	74	1.630	1600	.15	.20
51	104	1.155	1900	.21	.20
52	80	1.506	2300	.20	.18
55	74	1.631	2200	.18	.18
57	52	2.308	2800	.20	.21
62	73	1.654	3100	.25	.25
66	60	2.013	2600	.26	.25
67	52	2.308	3300	.26	.25
75	46	2.609	4000	.27	.21
77	52	2.293	3600	.28	.25
78	46	2.609	4900	.38	.28
83	30	4.000	4950	.39	.36
85	30	4.000	7600	.49	.49
88	46	2.609	5750	.48	.31
93	30	4.033	7500	.54	.49
95	30	3.967	8700	.59	.60
103	39	3.075	9600	.74	.64
108	25½	4.720	9900	.70	.87
110	25½	4.720	12700	.82	1.02
114	37	3.250	11000	.94	.93
122	20	6.050	15000	1.25	1.74
124	30	4.063	12700	1.14	1.31
146	20	6.150	14000	1.13	1.42

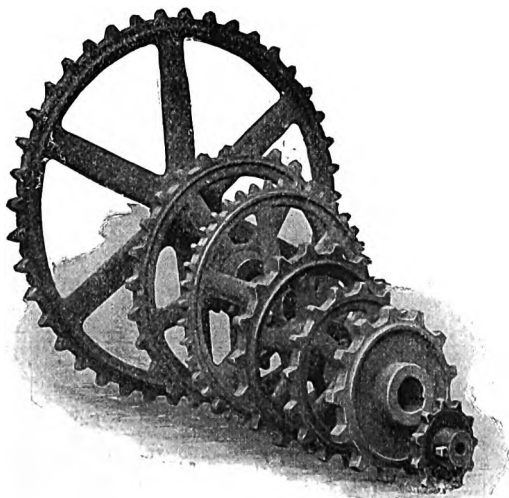


FIG. 1534
SPROCKET WHEELS

SPROCKET WHEELS

We supply in all sizes and for all styles of chain, sprocket wheels designed and manufactured with careful regard for service requirements.

SPECIAL SPROCKETS

SOME OF THE TYPES OF SPECIAL SPROCKETS WHICH WE ARE PREPARED TO FURNISH FROM STOCK PATTERNS

We are prepared to make special patterns for sprockets and drums to meet unusual requirements, and can furnish all sprockets and drums in cast steel when so ordered.

IMPORTANT—READ BEFORE ORDERING

Webb Center Sprockets are Standard. Specify which is wanted when ordering.

Prices cover sprockets bored to sizes and key-seated or set-screwed.

An extra charge is made for sprockets having special hubs, or large bores, or having both keyseat and set-screws.

Extra charge for facing hubs of sprockets.

Extra charge for splitting sprockets.

Sprockets are furnished of gray iron, unless ordered otherwise.

IN ORDERING SPROCKETS MENTION

1. Number of each kind wanted.
2. Metal wanted if not gray iron.
3. Whether Webb Center or Arm Pattern is wanted.
4. Number of teeth (counted, as a check on the diameter).

5. Number of chain used.

6. Diameter of bore.

If casting only is wanted, state diameter and shape of shaft for which it is to be bored (giving other particulars as here suggested).

If sprocket is to be bored, state whether keyseated or set-screwed or both.

If keyseat is wanted, specify whether standard or special (standard furnished unless otherwise ordered).

If keyseat is of different size from P.S.M.D. standard, give width and depth.

If sprocket is wanted split, be sure to mention it; otherwise it will be furnished plain.

Extra charges for splitting.

If hub is special, send sketch with particulars, such as diameter, length, projection from center on either or both sides, indicating whether faced at both ends or one (and which one).

If jaw clutch hub is desired, give diameter; number and depth of jaws; state whether square or spiral; and if spiral, whether right or left-hand. If clutch is of P.S.M.D. pattern, give pattern number, and if not give details of measurement.



FIG. 1535

ALL SPROCKETS CAN BE MADE SPLIT WHEN DESIRED.



FIG. 1536

SPECIAL HOOK TOOTH SPROCKETS FOR LIVE ROLLS.

SPROCKET WHEELS FOR RIVETED TRANSFER CHAIN

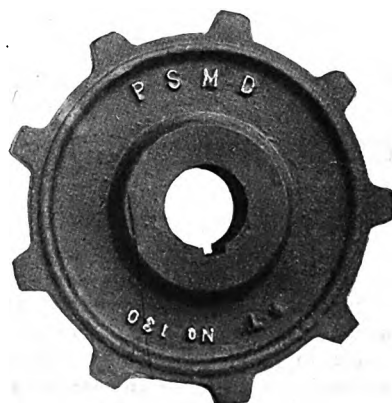


FIG. 1537

SPECIAL SPROCKETS FOR NOS. 130, 131, 131½, TRANSFER CHAINS

A complete line of sprockets for all standard sizes of both riveted and detachable chains are carried in stock. Special sprockets made to order. Prices on application.

TRANSFER CHAINS TO BE USED WITH THESE SPROCKETS ARE SHOWN ON PAGE 446

SPROCKET WHEELS FOR RIVETED CHAINS

BORED AND KEY-SEATED OR SET-SCREWED

NOTE—These sprockets are made extra heavy and especially adapted to use with Riveted Chain.



FIG. 1538
WEBB CENTER PATTERN



FIG. 1539
ARM PATTERN

Webb Center Sprockets are Standard; specify which is wanted when ordering.

SPROCKETS FOR RIVETED AND BOX LINK SAW DUST CHAIN

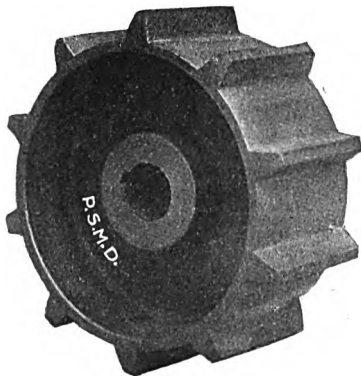


FIG. 1540
PLAIN SOLID WEBB SPROCKET

We can furnish sprockets and idlers of any size, for any size sawdust chain, either with or without extended rims.



FIG. 1541
EXTENDED RIM SPROCKET

GEARS AND PINIONS

Spur, bevel, miter, spiral, helical and herringbone gears; rawhide gears and pinions; worms, worm wheels and internal gears; ratchets; heavy duty hardened auto transmission and tractor gears; ignition gears; pump gears; magneto gears. We are in position to furnish cut gears and cast gears for any service and solicit inquiries for anything required in the way of gears and pinions and are in position to make prompt delivery.

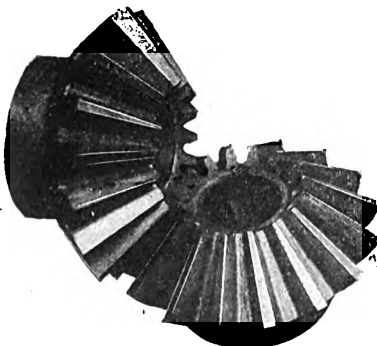


FIG. 1542



FIG. 1543

"SALEM" STEEL BUCKETS

SALEM—FIG. 1544

AVERY—FIG. 1544½

U. S. STANDARD GAUGE USED FOR ALL BUCKETS

PRICE LIST

Cap. Bushels per hour, speed 250 ft. per min. Buckets 12 in. apart	Size of Bucket		Suitable for Ordinary Mill and Elevator Work						Suitable for Ear Corn Corn Cob & Similar Heavy Substances		Suitable for Ores, Coal, Broken Stone and Extra Heavy Substances.				
	Length Inches	Nominal *Projec- tion Inches	Gauge Number						18	16	14	12	10	8	6
			24	23	22	21	19	18							
40	2½	2¼	\$.15	...	...	...	...	...	\$ .30	...	...	...	...	...	...
59	3	2½	.15	...	...	...	...	...	.30	...	...	...	...	...	...
69	3½	2½	.15	...	...	...	...	...	.35	...	...	...	...	...	...
87	3	3	...	\$.15	...	...	...	...	...	\$ .44	...	...	...	...	...
102	3½	3	...	.15	...	...	...	...	...	.47	...	...	...	...	...
116	4	3	...	.23	...	...	...	...	...	.52	...	...	...	...	...
131	4½	3	...	.23	...	...	...	...	...	.60	...	...	...	...	...
159	4	3½	...	...	\$ .23	...	...	...	...	.57	\$.62	...	...	...	...
179	4½	3½	...	...	.23	...	...	...	...	.60	.65	...	...	...	...
199	5	3½	...	...	.28	...	...	...	...	.66	.71	...	...	...	...
229	5	4	...	...	.28	...	...	...	...	.72	.76	\$1.07	...	...	...
251	5½	4	...	...	...	\$ .33	...	...	...	.74	.80	1.10	...	...	...
274	6	4	...	...	...	.33	...	...	...	.75	.81	1.13	...	...	...
500	7	4½	...	...	...	.45	...	...	...	.84	.90	1.25	\$1.55	...	...
670	8	5	...	...	...	...	\$ .57	...	...	.95	1.02	1.40	1.73	\$2.04	\$2.34
754	9	5	...	...	...	...	.60	...	...	1.23	1.22	1.68	2.02	2.45	2.82
973	10	5½	...	...	...	...	.72	...	...	1.29	1.40	1.92	2.37	2.81	3.23
1220	10	6	...	...	...	...	...	\$ .83	...	1.37	1.47	2.04	2.51	2.87	3.42
1342	11	6	...	...	...	...	...	.95	...	1.47	1.58	2.18	2.68	3.18	3.66
1404	12	6	...	...	...	...	...	1.05	...	1.55	1.67	2.30	2.84	3.33	3.84
1708	14	6	...	...	...	...	...	1.20	...	1.58	1.70	2.34	2.90	3.42	3.95
1952	16	6	...	...	...	...	...	1.35	...	1.65	1.79	2.45	3.03	3.59	4.13

Galvanizing extra. *In Salem Buckets this dimension is measured across the top of the bucket, and the actual projection at right angles with the back is therefore somewhat less.

Prices on special sizes, reinforced buckets or buckets with other special features, on application.

AVERY EXTRA HEAVY ORE BUCKET

This Bucket is rapidly supplanting the heavy malleable iron bucket. It is lighter, cheaper, more durable and better shaped. These buckets take up and discharge material with a minimum of friction, giving greatest wearing efficiency to the belt. Seamless steel. All corners round. In stock in sizes named. No other sizes made.

PRICE LIST

Capacity, Cubic Ins.	Width on Belt Inches	Projection Inches, "A"	Length on Belt, Inches "B"	Gauge of Steel	Price Black	Price Galvanized
31	5	4	3½	16	\$.60	\$.80
46	6	4	3¾	16	.72	.95
60	7	4½	3¾	16	.84	1.10
90	8	5	4	15	1.00	1.30
117	9	5½	4½	15	1.28	1.65
138	10	5½	4¾	14	1.56	2.05
170	11	6	4¾	14	1.84	2.40
208	12	6½	5½	13	2.12	2.75
263	14	6½	5¾	13	2.48	3.22
305	16	6½	5¾	12	3.00	3.90
416	18	7	6¼	12	3.60	4.70

Punched for belt or chain as wanted. If buckets are to replace others, or to go on belt already punched, send template. If punched for chain attachment, give number of link belt and style of attachment.

BUFFALO STANDARD REVERSIBLE STEEL PLATE MILL EXHAUSTERS

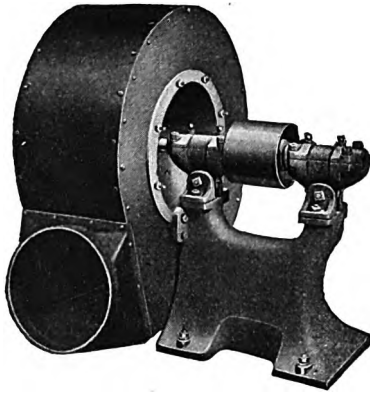


FIG. 1545

RIGHT HAND BOTTOM HORIZONTAL DISCHARGE

CONSTRUCTION

Heavy rolled steel plate, securely bolted together with angle irons, is used in the construction of the housing. A round cast iron outlet is bolted to the housing.

The blast wheel is mounted upon a heavy cast iron spider or hub. The spokes to which the vanes or blades of the fan are securely riveted are of tee steel, cast into the hub, insuring strength and rigidity. The heavy steel plate blades are not only riveted to the spokes, but also to the heavy steel plate side flanges.

In special cases, when heavy, bulky or abrasive material is to be handled, extra heavy blast wheels are furnished. Our engineers will gladly make the proper recommendations.

Cotton, wool and other textiles, as well as spent tan bark in tanneries and long stringy shavings in planing mills, require a wheel in which the material passing through the exhauster will not be caught. A cone blast wheel constructed with a heavy back plate and without any front flange is furnished for such materials.

Every wheel is balanced by special method which insures smooth running and absence of vibration. A running test is made upon each fan at speeds far beyond those required in practice.

The blast wheel is overhung on a shaft of hardened steel so that the material passing through the fan does not come in contact with the bearings.

These exhausters have reversible housings, adjustable to either hand and to any direction of discharge.

All adjustments are made in a few minutes and on the outside of the housing.

To change the direction of discharge, it is only necessary to loosen the hook bolts in the ring of each pedestal and take out one bolt, then revolve the housing until the discharge points in the desired direction. To change the hand, remove the hook bolts loosen set screws holding the blast wheel to shaft, then shift the pedestals. The advantages are self-evident. One fan may be used to meet any requirement, eliminating the necessity for crossed belts and avoiding all sharp angles. To the mill owner this is desirable, because it is frequently necessary to change the position of the fan, due to alterations or enlargement of the piping and building. The fan can quickly be adjusted to the new position and meets the requirements like a fan built for the place..

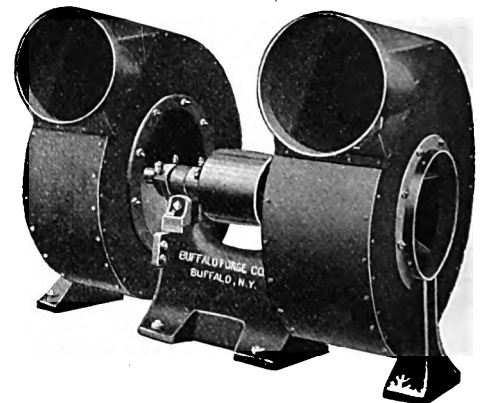


FIG. 1546

DOUBLE TOP HORIZONTAL DISCHARGE

STANDARD SELF-ALIGNING OIL-RING BEARINGS

Buffalo double oil-ring and self-aligning bearings have given extreme satisfaction for many years.

The journal, five diameters in length and lined with the best white metal, has two chambers for the oil rings. These rings constantly carry oil to the shaft. It is impossible for the bearings to be without lubrication as long as there is oil in the chambers.

The rings operate perfectly quiet until the oil become low. Any noise, therefore, is a signal for re-oiling.

The bearings are self-aligning vertically and bolted to the pedestal in such a way that considerable adjustment is possible horizontally, making the bearings to all practical purpose self-aligning in both directions.

BUFFALO STANDARD REVERSIBLE STEEL PLATE MILL EXHAUSTERS

SUGGESTIONS TO FOLLOW IN ORDERING

In ordering a fan, in addition to giving the size, always state the hand and discharge desired. The standard arrangement is right hand, bottom horizontal discharge, and if we are not advised otherwise, a fan of this arrangement will be shipped. While the hand and discharge can be changed on Standard Steel Plate Mill Exhausters, the same is not the case with motor or turbine driven units nor with the "B" Volume Exhausters.

The "hand" of the fan is determined by the location of the drive side when one stands facing the outlet of the fan. If the pulley, motor or turbine is on the left, it is called "left hand,"

if on the right, "right hand." The discharge is designated as "Bottom Horizontal," "Vertical Down," "Up-Blast," or "Top Horizontal" as the case may be.

In ordering a new blast wheel, it is very essential, in addition to informing us of the kind and number of fan, that we know all of the dimensions in connection with the same.

We request that information relative to the service in which the fan is to be employed be stated in ordering, thus avoiding dissatisfaction due to the purchase of equipment not designed for the work imposed on it.

SPECIFICATIONS AND PRICES

SINGLE FANS

DIMENSIONS GIVEN ARE IN INCHES

DOUBLE FANS

Size Fan	Outside Diameter of Inlet and Outlet	PULLEYS		Weight	List Price of Single Fan	Size Fan	Outside Diameter of Inlet and Outlet	PULLEYS		Weight	List Price of Double Fan
		Diam.	Face					Diam.	Face		
25	10	5	4	250	.....	30	12	6	6½	640	.....
30	12	6	4½	330	.....	35	14	7	7½	740	.....
35	14	7	5½	420	.....					
40	16	8	6½	600	.....	40	16	8	8½	1100	.....
45	18	9	7½	800	.....	45	18	10	9½	1500	.....
50	20	10	8½	900	.....	50	20	12	10½	1700	.....
55	22	11	9½	1200	.....	55	22	13	11½	2400	.....
60	24	12	10½	1600	.....	60	24	14	12½	2800	.....
70	28	14	11½	2200	.....	70	28	16	14	4000	.....
80	32	16	12½	2800	.....	80	32	20	16	5200	.....
90	36	18	16½	4500	.....					

BUFFALO SINGLE STANDARD MILL EXHAUSTERS SPEED AND POWER REQUIREMENTS

SIZE	1 OZ.			2 OZ.			3 OZ.		
	R. P. M.	Cap.	H. P.	R. P. M.	Cap.	H. P.	R. P. M.	Cap.	H. P.
25	1244	1190	.65	1758	1682	1.84	2153	2060	3.38
30	1025	1650	.90	1450	2340	2.55	1775	2850	4.65
35	890	2300	1.25	1260	3250	3.53	1540	3975	6.48
40	770	3000	1.63	1090	4250	4.60	1334	5190	8.40
45	690	3825	2.08	976	5410	5.95	1195	6620	10.78
50	622	4750	2.58	880	6720	7.28	1078	8220	13.38
55	570	5750	3.12	806	8120	8.83	987	9950	16.25
60	520	6900	3.75	735	9750	10.60	900	11950	19.50
70	450	9400	5.10	637	13300	14.50	780	16300	26.60
80	390	12200	6.63	552	17280	18.75	676	21200	34.50
90	345	15300	8.32	488	21640	23.80	297	26480	43.12
100	311	19000	10.32	440	26880	29.12	539	32880	53.52
SIZE	4 OZ.			5 OZ.			6 OZ.		
	R. P. M.	Cap.	H. P.	R. P. M.	Cap.	H. P.	R. P. M.	Cap.	H. P.
25	2488	2390	5.02	2781	2660	7.03	3047	2915	9.55
30	2050	3300	7.20	2290	3680	10.05	2510	4040	13.32
35	1780	4600	10.00	1990	5140	13.92	2180	5630	18.35
40	1540	6000	13.00	1722	6700	18.15	1888	7350	23.85
45	1380	7650	16.60	1542	8550	23.20	1690	9350	30.40
50	1245	9500	20.60	1391	10600	28.80	1525	11620	37.90
55	1140	11500	25.00	1275	12850	34.90	1398	14080	45.80
60	1040	13800	30.00	1162	15400	41.90	1273	16900	55.00
70	900	18800	40.90	1005	21000	56.90	1100	23000	75.00
80	780	24400	53.00	872	27300	74.00	956	29850	97.20
90	690	30600	66.40	771	34200	92.80	845	37400	121.60
100	624	38000	82.40	695	42400	115.20	762	46480	151.60

BUFFALO SLOW SPEED, HIGH EFFICIENCY MILL EXHAUSTERS

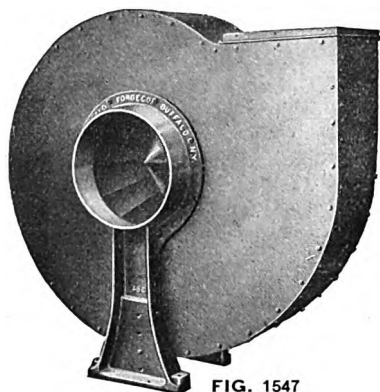


FIG. 1547
BACK VIEW RIGHT HAND UP BLAST
DISCHARGE

It is often possible to re-arrange an exhaust system so as to take less power even though the fans are not changed, but we have in many cases installed slow speed fans in place of old style fans, making considerable reduction in power, although no other part of the system was changed in any respect. Further particulars on these installations will be given on request.

CONSTRUCTION

The same general features of construction that make the standard exhaust fans so serviceable are incorporated in the Buffalo slow speed fans, namely, housings adjustable to any direction of discharge, double oil-ring and self-aligning bearings, and the liberal use of the best materials of construction, so essential to a high class machine.

The blast wheel is designed and built to last as long as the fan. A heavy back plate is the foundation upon which are

Slow speed fans are no more efficient on account of the reduced speed, except in so far as they cause less slippage of belts. They do decrease the wear and tear and vibration, and in the long run would be a good investment even if the power required were the same.

Actual installations of Buffalo Slow Speed Exhausters show power savings from 15 to 50%. The former figure represents the difference in efficiency between this fan and the standard fans, and in the latter is included the additional saving due to improved layout of piping often effected by our engineering service.

To obtain this result the blast wheels are made of large diameter and comparatively narrow width; the inlets are small in proportion to the size of the housing; for instance the 50-inch slow speed fan has the same size inlet pipe as the ordinary 50-inch trade fan, but the housing is actually about 70 inches high.

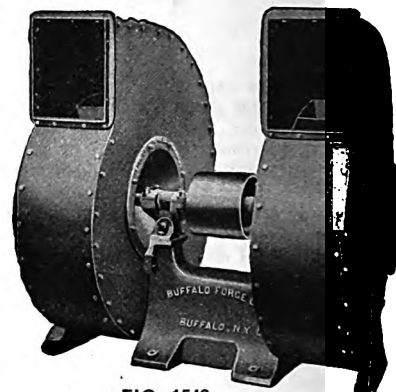


FIG. 1548
BUFFALO DOUBLE SLOW SPEED
MILL EXHAUSTER

riveted the twelve blades. A steel plate front flange, securely riveted to the blades, completes the general construction. The blades are very wide at the back, giving a long riveting flange.

This design also helps to make the material pass through the fan without any abrupt change of direction and reduce eddy currents at the back. A smooth, heavy steel plate conveys aids in this gradual deflection.

When conveying stringy material, such as long shavings, bark, cotton and similar materials, the blast wheel must be of a design which will prevent clogging. For such materials we furnish a wheel which has proven very successful. The construction is extra heavy to withstand the severe conditions encountered. The front flange is omitted, and the vanes are spaced further apart.

BUFFALO SINGLE SLOW SPEED, HIGH EFFICIENCY EXHAUSTERS SPEED AND POWER REQUIREMENTS

SIZE	1 OZ.			2 OZ.			3 OZ.		
	R. P. M.	Cap.	H. P.	R. P. M.	Cap.	H. P.	R. P. M.	Cap.	H. P.
25	770	1190	.55	1088	1682	1.56	1333	2060	2.85
30	640	1650	.75	906	2340	2.12	1110	2850	3.87
35	552	2300	1.04	781	3250	2.94	958	3975	5.40
40	482	3000	1.36	682	4250	3.83	837	5190	7.00
45	428	3825	1.73	605	5410	4.96	742	6620	8.97
50	385	4750	2.15	544	6720	6.06	667	8220	11.10
55	350	5750	2.60	494	8120	7.35	606	9950	13.50
60	321	6900	3.12	453	9750	8.83	556	11950	16.20
70	275	9400	4.25	387	13300	12.10	477	16300	22.10
80	241	12200	5.52	341	17280	15.60	418	21200	28.70
90	214	15300	6.92	302	21640	19.84	371	26480	35.88
100	192	19000	8.60	272	26880	24.24	333	32880	44.40
SIZE	4 OZ.			5 OZ.			6 OZ.		
	R. P. M.	Cap.	H. P.	R. P. M.	Cap.	H. P.	R. P. M.	Cap.	H. P.
25	1540	2380	4.4	1721	2660	6.14	1886	2915	8.1
30	1280	3300	6.00	1428	3680	8.37	1570	4040	11.10
35	1100	4600	8.32	1230	5140	11.59	1350	5630	15.25
40	965	6000	10.80	1075	6700	15.10	1180	7350	19.84
45	855	7650	13.80	955	8550	19.3	1050	9350	25.30
50	769	9500	17.12	860	10600	24.0	942	11620	31.50
55	698	11500	20.80	782	12850	29.1	856	14080	38.10
60	641	13800	25.00	718	15400	34.7	786	16900	45.80
70	550	18800	34.10	613	21000	47.3	674	23000	62.40
80	482	24400	44.20	570	27300	61.7	590	29550	81.00
90	427	30600	55.20	472	34200	77.2	525	37400	101.20
100	384	38000	68.48	430	42400	96.0	471	46480	126.00

FOR SPECIFICATIONS SEE NEXT PAGE

BUFFALO SLOW SPEED, HIGH EFFICIENCY MILL EXHAUSTERS

SPECIFICATIONS AND PRICES. DIMENSIONS ARE IN INCHES

Size Fan	SINGLE AND DOUBLE			SINGLE PULLEYS		DOUBLE PULLEYS		SINGLE		DOUBLE	
	Diameter Inlet	Size Outlet	Maximum Height	Diameter	Face	Diameter	Face	Weight Pounds	List Price	Weight Pounds	List Price
25	10	9 $\frac{5}{8}$ x 8 $\frac{3}{8}$	36 $\frac{3}{4}$	6	4 $\frac{1}{2}$	..	....	350	.....	.....	.....
30	12 $\frac{1}{2}$	11 $\frac{3}{4}$ x 9 $\frac{7}{8}$	41 $\frac{3}{4}$	8	5	8	7 $\frac{1}{2}$	475	.....	850	.....
35	14 $\frac{1}{2}$	13 $\frac{3}{8}$ x 11 $\frac{1}{2}$	48 $\frac{3}{4}$	9	6	9	8 $\frac{1}{2}$	610	.....	1100	.....
40	16 $\frac{1}{2}$	15 $\frac{3}{8}$ x 13 $\frac{1}{8}$	55	10	7	11	9 $\frac{1}{2}$	900	.....	1425	.....
45	18 $\frac{1}{2}$	17 $\frac{3}{8}$ x 14 $\frac{5}{8}$	62	11	8	12	10 $\frac{1}{2}$	1200	.....	1900	.....
50	20 $\frac{1}{2}$	19 $\frac{1}{4}$ x 16 $\frac{5}{8}$	69 $\frac{1}{4}$	12	9	13	11 $\frac{1}{2}$	1550	.....	2600	.....
55	22 $\frac{3}{4}$	21 $\frac{3}{8}$ x 18 $\frac{1}{8}$	75 $\frac{1}{2}$	13	10	14	12 $\frac{1}{2}$	1750	.....	3200	.....
60	24 $\frac{3}{4}$	23 $\frac{1}{8}$ x 19 $\frac{7}{8}$	82 $\frac{1}{2}$	14	11	16	15	2200	.....	4000	.....
70	28 $\frac{3}{4}$	27 x 23	96 $\frac{1}{2}$	16	12	20	18	3000	.....	5350	.....
80	32 $\frac{3}{4}$	30 $\frac{3}{4}$ x 26 $\frac{1}{2}$	110 $\frac{3}{4}$	20	14	24	22	4400	.....	6400	.....
90	37 $\frac{1}{4}$	35 $\frac{1}{4}$ x 29 $\frac{1}{4}$	123	28	14 $\frac{1}{2}$	..	....	6000	.....	.....	.....

NOTE:—The maximum height as noted is for bottom horizontal discharge. When the housing is swung around for other directions of discharge, this dimension will change.

BUFFALO STEEL PRESSURE BLOWERS

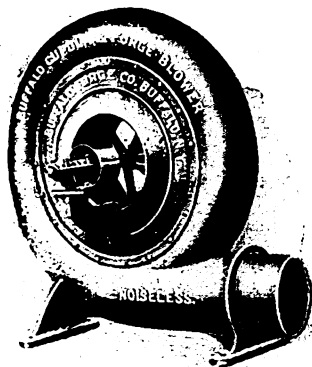


FIG. 1549

For supplying blast to forge fires, cupolas, furnaces, and for any work where air is to be forced a long distance, as in pneumatic tube systems, the Buffalo Steel Pressure Blower has no equal.

SOLID PERIPHERAL SHELL

The Buffalo Steel Pressure Blower is easily distinguished by the small shell housing, consisting of the one-piece peripheral shell and the side plates. By merely loosening the two nuts in the hub, the latter may be promptly slid off the shaft. Both may be put back into place just as easily by the most unskilled help.

SPECIFICATIONS AND PRICES

For Table of Capacities with Speed and Horse Power Requirements see page 458.

Number of Blower	Height in inches	Diam. of Outlet	Diam. of Pulley	Face of Pulley	Weight Pounds	List Price without Countershaft	List Price with Countershaft	List Price with Adj. Bed but without Countershaft
1	12 $\frac{1}{2}$	3 $\frac{5}{8}$	2 $\frac{1}{4}$	1 $\frac{3}{4}$	80	.....	.....	.....
2	15	4	2 $\frac{3}{4}$	2 $\frac{1}{4}$	100	.....	.....	.....
3	20	4 $\frac{5}{8}$	3	2 $\frac{5}{8}$	140	.....	.....	.....
4	24	5 $\frac{1}{8}$	4	3	150	.....	.....	.....
5	26	5 $\frac{1}{2}$	4 $\frac{1}{4}$	3	200	.....	.....	.....
6	30	6 $\frac{1}{4}$	4 $\frac{1}{2}$	3 $\frac{1}{2}$	290	.....	.....	.....
7	35	7 $\frac{1}{4}$	5	4 $\frac{1}{2}$	340	.....	.....	.....
8	40	8 $\frac{5}{8}$	6	4 $\frac{1}{2}$	500	.....	.....	.....
9	45	10	7	5	700	.....	.....	.....
10	56	12 $\frac{1}{4}$	8	5 $\frac{3}{4}$	900	.....	.....	.....
11	66	14 $\frac{3}{8}$	8 $\frac{1}{2}$	6 $\frac{1}{2}$	1500	.....	.....	.....
11 $\frac{1}{2}$	76	16 $\frac{1}{2}$	10	7	2000	.....	.....	.....
12	80	18	10	8	2100	.....	.....	.....

BUFFALO STEEL PRESSURE BLOWERS

TABLE OF CAPACITIES WITH SPEED AND HORSE POWER REQUIREMENTS

R. P. M. indicates Revolutions per Minute.

Cap. indicates Cubic Feet of Air delivered per Minute against stated pressure.

H. P. indicates Horse Power required to operate at given speed.

No. of Blower	4 Oz.			5 Oz.			6 Oz.		
	R.P.M.	Cap	H.P.	R.P.M.	Cap	H.P.	R.P.M.	Cap	H.P.
2	4990	285	.81	5595	320	1.01			
3	3950	565	1.25	4435	635	1.75	4840	690	2.3
4	3330	600	1.32	3730	670	1.85	4065	730	2.40
5	2930	670	1.47	3290	755	2.06	3585	825	2.70
6	2550	880	1.94	2860	985	2.70	3115	1076	3.52
7	2255	1045	2.27	2535	1170	3.32	2765	1275	4.15
8	2050	1570	3.43	2300	1765	4.80	2510	1925	6.28
9	1840	2225	4.84	2060	2500	6.80	2245	2720	8.87
10	1375	3255	7.09	1540	3655	9.93	1680	3990	13.0
11	1145	4010	8.74	1285	4515	12.3	1400	4915	16.1
11½	907	4500	10.1	1020	5040	14.1	1110	5500	18.5
12	930	5210	11.3	1045	5840	15.9	1135	6380	20.8

FOR CUPOLA SERVICE

A proper air supply to the cupola is the chief consideration leading to economical, rapid and continuous melting, and also to the fine quality of iron obtained. It further results in the most economical fuel ratio.

The steady trend of foundry cupola practice has been to decrease the blast pressure and increase the Tuyere area, so as to supply the necessary air volume at as low pressure as is practicable. This has been found to give the best results with the least power consumption. Owing to the decreased density of air in warm weather it becomes necessary to supply a greater volume of air than is required in cold weather to melt the same quantity of iron. At such times the flexibility of an independent engine or motor for driving the blower will be appreciated.

In order to reduce frictional losses, all blast piping should be of ample diameter, free from sharp bends, and as short as possible. Drawings showing the proper size and arrangement of blast pipes will be gladly prepared on application. Blast gates should be included in every installation.

TABLE OF SPEEDS, CAPACITIES AND H. P. FOR CUPOLA SERVICE

CAP. is lbs. of metal melted per hour. A.P.M. is cubic feet of air required per minute. H.P. is power required to deliver at pressure given.

Diam. of Cupola	Static Pressure at Cupola in oz. per sq. inch					
	10-oz.	12-oz.	14-oz.	16-oz.	18-oz.	
30 in.	5690	6230	6730	7200	7640	CAP.
	1423	1558	1688	1800	1910	A.P.M.
	7.4	9.7	12.3	15.0	17.9	H.P.
	7740	8480	9170	9800	10390	CAP.
35 in.	1935	2120	2293	2450	2773	A.P.M.
	10.0	13.2	16.7	20.4	25.9	H.P.
	10120	11080	11970	12800	13570	CAP.
	2530	2770	2993	3200	3393	A.P.M.
40 in.	13.2	17.3	21.8	26.6	31.8	H.P.
	12810	14030	15150	16200	17180	CAP.
	3203	3508	3788	4050	4295	A.P.M.
	16.7	21.9	27.6	33.7	40.2	H.P.
45 in.	15810	17320	18700	20000	21210	CAP.
	3953	4330	4675	5000	5303	A.P.M.
	20.6	27.0	34.0	41.6	49.6	H.P.

Diam. of Cupola	Static Pressure at Cupola in oz. per sq. inch					
	10-oz.	12-oz.	14-oz.	16-oz.	18-oz.	
55 in.	19130	20960	22640	24200	25660	CAP.
	4783	5240	5660	6050	6415	A.P.M.
	24.9	32.7	41.2	50.3	60.0	H.P.
	22770	24940	26940	28800	30540	CAP.
60 in.	5693	6235	6735	7200	7635	A.P.M.
	29.6	38.9	49.0	59.9	71.5	H.P.
	26730	29270	31620	33800	35840	CAP.
	6683	7318	7905	8450	8960	A.P.M.
65 in.	34.8	45.7	57.5	70.3	83.9	H.P.
	30990	33950	36670	39200	41570	CAP.
	7748	8488	9168	9800	10393	A.P.M.
	40.3	52.9	66.7	81.5	97.3	H.P.

No. of Blower	7 Oz.			8 Oz.			10 Oz.		
	R.P.M.	Cap	H.P.	R.P.M.	Cap	H.P.	R.P.M.	Cap	H.P.
4	4395	785	3.05						
5	3870	890	3.38	4130	950	4.14			
6	3360	1160	4.42	3585	1240	5.42	4000	1385	7.55
7	2985	1375	5.25	3180	1470	6.40	3560	1640	8.90
8	2710	2080	7.93	2890	2220	9.66	3225	2480	13.6
9	2425	2940	11.2	2585	3135	13.7	2890	3500	19.0
10	1815	4305	16.4	1935	4590	20.0	2160	5135	27.9
11	1510	5300	20.3	1615	5660	24.7	1800	6320	34.4
11½	1200	5940	23.4	1280	6350	28.5	1425	7150	40.2
12	1230	6880	26.3	1310	7350	32.0	1460	8200	44.6

No. of Blower	12 Oz.			14 Oz.			16 Oz.		
	R.P.M.	Cap	H.P.	R.P.M.	Cap	H.P.	R.P.M.	Cap	H.P.
6	4380	1510	9.90						
7	3880	1790	11.7	4195	1930	14.7			
8	3525	2705	17.6	3810	2920	22.3	4060	3115	27.1
9	3155	3825	25.0	3410	4125	31.4	3635	4400	38.3
10	2360	5595	36.5	2545	6040	46.1	2720	6510	56.7
11	1970	6900	45.0	2120	7455	56.7	2265	7940	69.1
11½	1555	7720	52.0	1680	8340	65.5	1795	8960	80.5
12	1595	8955	58.4	1720	9660	73.5	1840	10395	90.5

BUFFALO ELECTRIC FORGE BLOWERS

VARIABLE SPEED TYPE

NO COST OF INSTALLATION—WE FURNISH WIRE AND PLUG

These small blowers are used for a great variety of purposes, such as blowing furnaces, church organs and forge fires; removing scale from power hammers and chips in metal and woodworking operations, etc.; or for exhausting from small grinding and buffing wheels used in a variety of trades.

The motor is of such design that it will operate efficiently and with equal satisfaction on any circuit, either direct or alternating current, 25, 40, 50 or 60 cycle.

The 2-E uses less current than a 16 C.P. bulb and as we furnish wire and plug with each outfit, they can be installed without expense, simply by screwing the plug into a lamp socket.

The large diameter and superior design of the fan, with blast delivery along the line of least resistance, gives minimum friction, therefore longest life and lowest power consumption. The oil chamber is large and the running parts self-oiling. The oil cups cannot be knocked off. The brushes are from two to three times larger than the ordinary to avoid frequent replacing. A speed regulator is furnished giving six variations of blast, from the lightest to the strongest. When ordering simply state if for 110 or 220 volts.

The fan case is always arranged for blowing and will be shipped this way unless specifically stated that it is wanted for exhaust service.



FIG. 1553

SPECIFICATIONS AND PRICES — ON 110 OR 220 VOLT CIRCUITS.

Variable Speed Motors	No. 2-E	No. 2-EH	No. 3-E
R.P.M.	2600	3400	3400
Diam. of Outlet, inches	3	3	4
Total Height, inches	15	15	15
Capacity, Air per Minute, cubic feet	75	150	200
Pressure, ounces	1½	2½	2
Weight, lbs.	70	85	100
List Price	.....	.....	.....

No. 2-E capacity one average fire; No. 2-EH one large or two small fires; No. 3-E three small fires.

CONSTANT SPEED TYPE

NO COST OF INSTALLATION—WE FURNISH WIRE AND PLUG

The application of this outfit is as wide as that of the Variable Speed Type. It is used where the Variable Speed would be of no special advantage.

It does not have a speed regulator but equally efficient control is obtained of blast by means of a sliding blast gate.

These outfits are made for: Direct current circuits, 110-220 volts; Alternating current, 110-220 volts, 60 cycle, single phase.

In ordering, please state specifically the nature of your current to avoid all misunderstanding. Wire and plug are furnished free with each outfit, excepting No. 4-E, which cannot be connected to lighting circuits and therefore requires special wiring. The other sizes can be installed without expense, simply by screwing the plug into a lamp socket. All outfits are made and shipped for blowing service, unless the order specifically states that they are wanted for exhaust service. No extra charge is made for the latter.

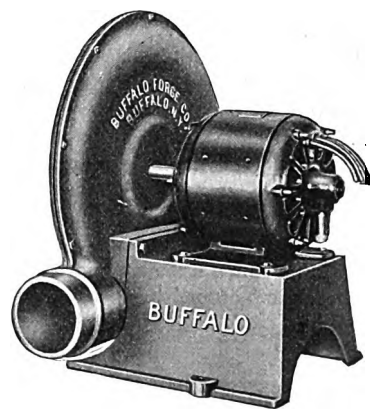


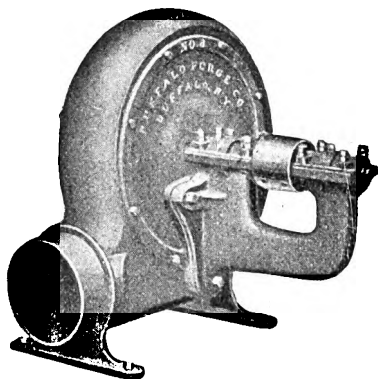
FIG. 1554

SPECIFICATIONS AND PRICES

Constant Speed Motors	No. 2-EH	No. 3-E	No. 4-E
Height over all, inches	15	15	20
Diameter of outlet, inches	3	4	5
A.C. Motor, Cycles	60	60	60
D.C. Motor, R.P.M.	3000	3000	3200
A.C. Motor, R.P.M.	3400	3400	3400
Capacity, Air per Minute, cubic feet	150	200	250
Pressure, ounces	2½	2	2½
Weight, pounds	80	100	150
List Price, A.C. Motor	.....	.....	.....
List Price, D.C. Motor	.....	.....	.....

No. 2-E capacity one small fire; No. 2-EH one or two fires; No. 3-E two or three fires; No. 4-E three to five fires.

BUFFALO "B" VOLUME BLOWERS AND EXHAUSTERS



EXHAUSTER—FIG. 1551

A particularly vital detail about any centrifugal fan is the design of the bearings and the method of supporting them. Buffalo "B" Volume Exhausters have extra long journal bearings of the Buffalo ring-oiling type.

EXHAUSTERS

The application of Buffalo "B" Volume Exhausters for the purpose of removing refuse from emery wheels, buffing wheels or machines used in any abrasive process, has been most extensive and satisfactory. Other uses are numerous, and hardly a day passes without seeing a new application for them in some industry. Among the most frequent applications, we might mention forge shop exhaust systems, removal of chemical fumes, small drying systems, induced and forced draft for boilers, and pneumatic conveying systems of all kinds.

Very often it is found desirable to remove shavings or other stringy material from a single machine, and the installation does not then warrant the purchase of a large steel plate fan. A "B" Volume Exhauster with a special non-clogging cone blast wheel will be found inexpensive and efficient in this case.

BLOWERS

This Blower is especially adapted for blowing Forge Fires and Boiler Fires. It is also recommended for use in connection with Steam Boilers, Heating and Puddling Furnaces. It is also adapted for all purposes where a large volume of air is required. These blowers are made of the highest grade of material, and can be made with an upward blast instead of horizontal, thus doing away with the use of an elbow.

These blowers and exhausters are built with a solid peripheral shell of heavy cast iron, to which detachable side plates are securely bolted. A great advantage of this construction, in addition to strength, is the easy access to the interior for the inspection of parts or making repairs. By removing just one of the side plates the blast wheel and shaft can be readily removed. It is unnecessary to dismantle the entire machine.

The blast wheel is of heavy rolled steel plate, mounted upon an iron spider or hub. The vanes are securely riveted, not only to the arms of the spider, but also to the heavy steel flange.

Each blast wheel is tested for both strength and balance beyond that required. A durable, smooth and easy-running fan is assured. The blast wheel is overhung, allowing a single unobstructed inlet.

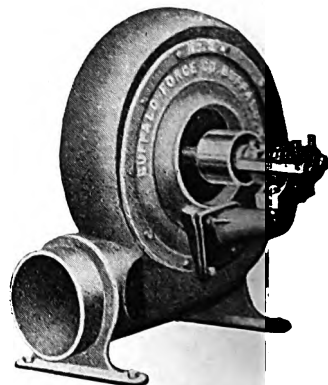
Cone blast wheels, are furnished when it is desired to remove stringy material.

These bearings are particularly suited for use where dust, dirt and grit fill the atmosphere. They require little attention beyond an occasional filling of the oil reservoir.

EXHAUSTERS FOR GASES AND ACID FUMES

When acid fumes and gases are to be removed, it is essential to have an exhauster which does not leak. We furnish special equipment with flanged inlet and outlet and stuffing box around shaft for this service. We furnish this apparatus for both low and high pressure, the latter type for pressures up to 24 ounces. The fans can be belt-driven or direct-connected to steam turbine or motor.

Corrosive acid gases often require exhauster shells constructed of special material, such as hard lead, monel metal, copper or special alloy; and blast wheels of copper, monel metal or other acid resisting metals. Our engineers will gladly make recommendations upon receipt of details.



BLOWER FIG. 1552

BUFFALO "B" VOLUME BLOWERS AND EXHAUSTERS

SPEEDS, CAPACITIES AND HORSEPOWER

The following table of speeds of Buffalo "B" Volume Blowers and Exhausters for various pressures in ounces per square inch and deliveries in cubic feet of air per minute may be followed in miscellaneous installations.

No. of Blower	½ Oz.			1 Oz.			2 Oz.			3 Oz.			4 Oz.			6 Oz.		
	R.P. M.	Cap.	H.P.	R.P. M.	Cap.	H.P.	R.P. M.	Cap.	H.P.	R.P. M.	Cap.	H.P.	R.P. M.	Cap.	H.P.	R.P. M.	Cap.	H.P.
1	1693	104	.023	2396	148	.074	3393	210	.233	4169	258	.382						
2	1397	264	.059	1976	374	.187	2800	534	.593	3437	651	.964	3977	753	1.37			
3	980	438	.098	1387	621	.310	1965	888	.987	2414	1090	1.615	2794	1261	2.29	3436	1551	3.86
4	859	585	.130	1216	828	.414	1724	1174	1.300	2119	1441	2.135	2452	1667	3.03	3015	2051	5.13
5	776	837	.186	1098	1185	.593	1556	1688	1.870	1912	2071	3.08	2212	2397	4.36	2721	2948	7.37
6	635	1185	.263	898	1677	.839	1274	2382	2.650	1563	2923	4.33	1809	3382	6.15	2225	4160	10.40
7	582	1372	.305	823	1941	.971	1168	2752	3.060	1434	3377	5.00	1660	3908	7.10	2041	4806	12.00
8	499	1986	.440	706	2810	1.405	1001	3983	4.430	1229	4888	7.24	1422	5656	10.20	1748	6957	17.40
9	411	3299	.733	581	4668	2.334	824	6641	7.300	1012	8150	12.10	1171	9431	17.10	1440	11599	28.90
10	349	4488	.997	494	6350	3.175	702	9003	9.900	861	11050	15.00	966	12786	21.90	1225	15726	37.00

SPECIFICATIONS AND PRICES

No.	Inlet Diameter Outside Inches	Outlet Diameter Outside Inches	Height inches	Weight Pounds	PULLEY, INCHES		List Price
					Diameter	Face	
000	5 $\frac{1}{8}$	5 $\frac{1}{8}$	14 $\frac{3}{4}$	45	2 $\frac{3}{4}$	2 $\frac{1}{4}$	.....
1	5 $\frac{3}{8}$	4 $\frac{1}{8}$	15 $\frac{7}{8}$	60	3	2 $\frac{1}{2}$	.....
2	6 $\frac{1}{8}$	6 $\frac{1}{8}$	20 $\frac{1}{2}$	100	3 $\frac{1}{8}$	2 $\frac{5}{8}$	.....
3	7 $\frac{1}{2}$	7 $\frac{5}{8}$	25	170	4	3	.....
4	9	9	28	200	5	3 $\frac{7}{8}$	.....
5	10 $\frac{5}{8}$	10 $\frac{5}{8}$	31 $\frac{5}{8}$	275	5 $\frac{3}{4}$	4 $\frac{5}{8}$	.....
6	12 $\frac{1}{8}$	11 $\frac{1}{4}$	37 $\frac{1}{8}$	380	6 $\frac{1}{2}$	5 $\frac{1}{4}$	.....
7	14	14	42 $\frac{5}{8}$	575	7 $\frac{1}{2}$	6 $\frac{1}{4}$	.....
8	16	16 $\frac{3}{8}$	47 $\frac{1}{8}$	725	8 $\frac{1}{2}$	7 $\frac{1}{4}$	.....
9	17 $\frac{1}{4}$	17 $\frac{3}{8}$	55 $\frac{1}{8}$	1100	9 $\frac{1}{2}$	8 $\frac{1}{4}$	.....
10	21	21	68 $\frac{3}{8}$	1600	12	9 $\frac{3}{4}$	.....
11	24 $\frac{1}{2}$	24 $\frac{1}{2}$	78 $\frac{3}{8}$	3200	14	12	.....

Special discharges 10% additional. In ordering please specify "B" Volume Blower or Exhauster, in full.

BUFFALO EXPERIMENTAL BLOWERS AND EXHAUSTERS

Are made upon the same principle as Buffalo Pressure Blowers. They operate noiselessly and yield as large a volume of air, in proportion to the sizes, as the other types, but will not produce the same amount of pressure. They are intended especially for blowing fires in portable and small stationary boilers, for experimenting and various purposes where a small quantity of air, at an average pressure, is desired. The No. 0 is sufficient to blow one forge fire; No. ½ is sufficient for three forge fires of average size.

SPECIFICATIONS AND PRICES

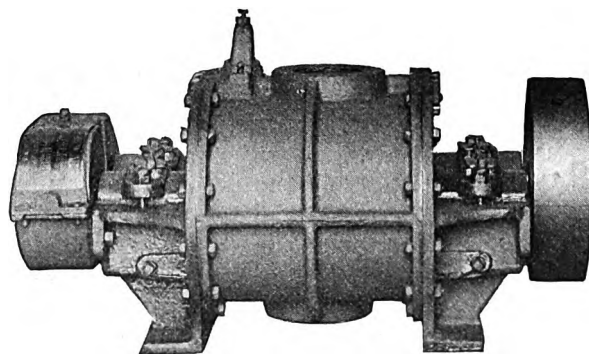
No.	Outside Diam. of Outlet	Height	Weight Lbs.	Pulley Diam. and Face	List Price
00	2 $\frac{3}{4}$	11"	30	1 $\frac{1}{4}$ x1 $\frac{1}{4}$"	.....
0	3	15"	40	1 $\frac{3}{4}$ x1 $\frac{3}{4}$"	.....
½	4 $\frac{1}{2}$	20"	50	1 $\frac{3}{4}$ x2"	.....

When ordering, state whether blower or exhauster is wanted. A blower cannot be used as an exhauster.



FIG. 1550

ROOTS ACME ROTARY POSITIVE BLOWERS & VACUUM PUMPS



LOW PRESSURE—FIG. 5142

Roots Acme Blowers are used for supplying air under pressure to oil and gas fired furnaces, forges, laundries, industrial gas appliances, for agitation of liquids, and similar services. Blowers are of the positive displacement type. Impellers are of close grained cast iron, machined all over, and pressed on steel shafts. Bearings are replaceable bronze sleeves, ring-oiled, and are oil tight and dust proof. Timing gears of semi-steel, with accurately cut teeth, are located on end opposite the drive, enclosed in an oil tight cast iron housing. All machines are built horizontal type with top discharge and bottom inlet, both openings being tapped for standard pipe. An adjustable relief valve should be fitted in the pipe line for each blower or vacuum pump. In ordering be sure to specify the type valve required.

Low pressure blowers are used to furnish air at pressures up to and including 2 pounds per square inch discharge pressure. High pressure blowers are used to furnish air at pressures over 2 pounds, up to and including 6 pounds per square inch. All blowers may be used as vacuum pumps by connecting up to the inlet of the blower. Low pressure blowers will carry a maximum vacuum of 4 inches of mercury. High pressure blowers will carry a maximum of 10 inches of mercury vacuum.

SIZES AND CAPACITIES
LOW PRESSURE

Acme Blower Size No.	Volume per Rev. Cu. Ft.	1 Lb. per Sq. In. Pressure						2 Lbs. per Sq. In. Pressure						Size Pulley	Size Inlet and Outlet Ins.	Size Relief Valve Ins.
		Normal Speed			Maximum Speed			Normal Speed			Maximum Speed					
		RPM	Cu. Ft. per Min. Net	BHP	RPM	Cu. Ft. per Min. Net	BHP	RPM	Cu. Ft. per Min. Net	BHP	RPM	Cu. Ft. per Min. Net	BHP			
3	0.10	700	45	0.33	850	60	0.41	650	30	0.62	800	45	0.76	7x1½	1½	1½
3½	0.20	600	85	0.57	750	115	0.71	550	60	1.05	700	90	1.33	8x2	2½	1½
4	0.34	525	130	0.85	650	175	1.05	475	100	1.53	600	140	1.93	10x3	3	2
4½	0.66	450	225	1.41	550	290	1.72	400	160	2.50	500	225	3.13	14x4	4	2

HIGH PRESSURE

Acme Blower Size No.	Volume per Rev. Cu. Ft.	3 Lbs. per Sq. In. Pressure						5 Lbs. per Sq. In. Pressure						Size Pulley	Size Inlet and Outlet Ins.	Size Relief Valve Ins.
		Normal Speed			Maximum Speed			Normal Speed			Maximum Speed					
		RPM	Cu. Ft. per Min. Net	BHP	RPM	Cu. Ft. per Min. Net	BHP	RPM	Cu. Ft. per Min. Net	BHP	RPM	Cu. Ft. per Min. Net	BHP			
3 B	0.06	750	20	0.64	900	30	0.77	700	10	1.00	850	20	1.21	7x1½	1½	1½
3½B	0.12	650	45	1.11	800	65	1.37	600	25	1.71	750	45	2.14	8x2	2½	1½
4 B	0.21	575	75	1.72	700	100	2.09	525	50	2.62	650	75	3.25	10x3	3	2
4½B	0.33	500	110	2.35	600	140	2.82	450	65	3.53	550	100	4.32	14x4	4	2

PRICES AND WEIGHTS

Acme Blower Size No.	With Single Pulley		Blower with Pulley and O. B.		With T. and L. Pulleys and O. B.		With T. and L. Pulleys O. B. and Belt Shifter		With Gear and Pinion Direct Drive on Bed Plate*	
	Weight	Price	Weight	Price	Weight	Price	Weight	Price	Weight	Price
LOW PRESSURE TYPE										
3	90	\$100.00	100	\$108.00	105	\$114.00	110	\$120.00	190	\$210.00
3½	175	150.00	190	162.00	200	170.00	210	176.00	350	290.00
4	275	240.00	300	256.00	315	268.00	325	276.00	575	420.00
4½	450	400.00	490	434.00	515	454.00	530	466.00	850	630.00
HIGH PRESSURE TYPE										
3 B	...	...	90	\$108.00	95	\$114.00	105	\$120.00	185	\$210.00
3½B	...	...	175	162.00	185	170.00	195	176.00	335	290.00
4 B	...	...	275	256.00	290	268.00	300	276.00	550	420.00
4½B	...	...	450	434.00	475	454.00	490	466.00	810	630.00

*Prices on motor driven units include all equipment except motor. When ordering give kind of current, voltage and cycles.

FOUR GATE SYSTEM FOR MINE VENTILATION

This cut illustrates the Four-Gate System for mine ventilation, which enables the engineer to drive fresh air into the mine or draw the smoke out by simply manipulating the gates, and without stopping the fan, as may be signalled from below. All mine operators will appreciate the importance of drawing the smoke out of the shaft or drift as soon as the blast is fired, which avoids the necessity of blowing the smoke out through the shaft, thus distributing the foul air throughout the entire workings. After the foul air has been drawn out the air current can be reversed and the pure air forced to the point where it is required. These systems are made up of size to suit the requirements of prospective customers, who must state the conditions in order to enable us to estimate intelligently upon the proper apparatus which will be needed.

Prices upon application.

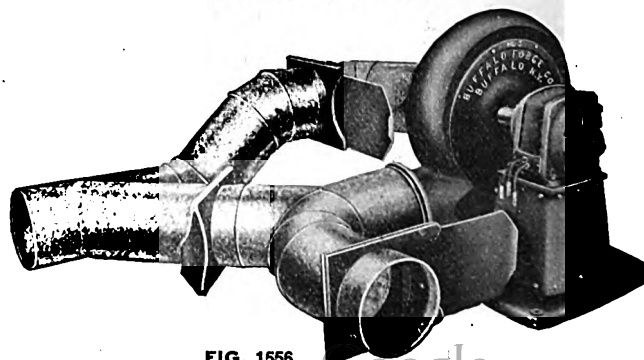


FIG. 1556

FLEXOID TUBING FOR MINE VENTILATION

Flexoid is a stout and flexible canvas tubing made in 25, 50 and 100 foot lengths that are easily carried by one man. The canvas is rendered airtight by thoroughly saturating it in a special preserving compound. Patented couplings, consisting of two contracting rings, permit two sections to be joined within fifteen seconds. One ring is contracted and slipped through the other to make an airtight joint that is compact and easy to handle.

With FLEXOID air can be forced very quickly any desired distance, up to 3,000 feet by joining additional sections. Ordinarily, the tubing is suspended from a wire attached to a messenger wire supported from sprags placed in the roof at 15 foot intervals. When 100 feet from the breast a short nipple is bolted to the wire by a cross arm to absorb the shock of the concussion. Another section, called the blasting piece is then connected and the end carried right against the breast. Just before shooting, the end section is removed and the tubing is then 100 feet away, safe from the action of blasts.

Run near the breast in a drift or stope, FLEXOID allows you to shoot at any time during the shift and to have the machine men back at work, "setting up" within twenty minutes after a blast. The effect such a saving will have upon production costs is tremendous. At a fair estimate labor represents 50% of the operating expenses of a mine so by the elimination of lost time after blasting production costs are reduced from 15 to 20 per cent by the use of FLEXOID.

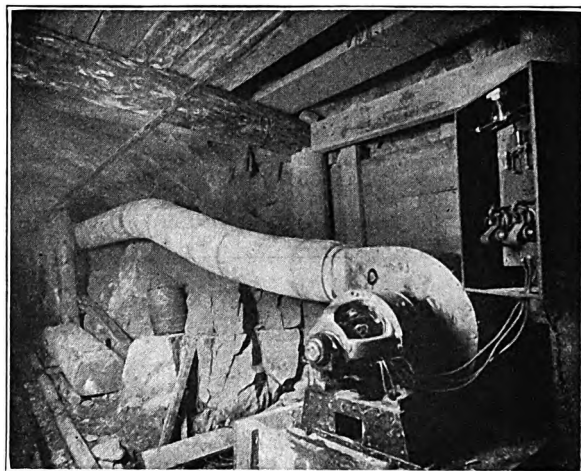


FIG. 1568

FLEXOID TUBING AND ACCESSORIES
THE BEST RESULTS ARE OBTAINED ONLY WHEN THE COMPLETE SYSTEM IS USED. WHEN ORDERING SPECIFY EACH PART DESIRED

COUPLINGS

Patented couplings are sewed in all lengths at the prices given in table.

BLASTING SECTIONS

To protect the tubing from flying rock, a blasting piece should be used. This section is a 100-ft. length equipped with special snapple hooks which unfasten easily when moving the blasting section back from the face.

SHAFT SUSPENSION COLLARS

For shaft suspension special collars which fit over the regular couplings are used.

NIPPLES

Each horizontal line should have one nipple which consists of four feet of tubing equipped with couplings, cross arm and concussion collar.

Y'S, T'S, L'S AND REDUCERS

To turn the air from the main Flexoid line into cross cuts at right angles, 45° or 60°, the "T's" and "L's" are used. Dampers are placed in them so the air can be thrown in either direction. Elbows are used for turning the air at 90° with a short radius down shafts, up stopes, and raises. Ordinarily these are not required since the tubing, on account of its great flexibility, goes around curves without decreased efficiency. The "Y's", "T's" and "L's" are made from galvanized iron treated with a special acid proof paint. The reducers are made from Flexoid fabric. Attached to each end of all connections is a section of the tubing, 18-in. long, containing a coupling. Each connection is a complete unit and can be quickly put in or taken out of a line in less than one minute without tools.

INFORMATION DESIRED WHEN ORDERING

When ordering please specify:

- (1) Size desired.
- (2) State lengths desired. (Quantity of 25, 50 and 100-ft. sections.)
- (3) State length of short piece required for connecting fan to first section of tubing.
- (4) How many blasting pieces required.
- (5) How many nipples. (One nipple and blasting piece needed for each separate line.)
- (6) For shaft work state number of suspension collars needed.

SEE NEXT PAGE FOR PRICES

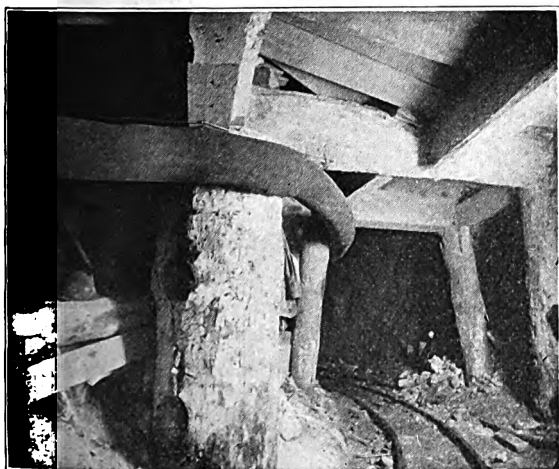


FIG. 1557

Its economies are well known quantities. It has more than doubled the rate of shaft sinking and has reduced tunneling costs by 50 per cent in the mines of the Butte Camp. One man can install 100 feet in five minutes. One thousand feet can be packed in an ore car, whereas an equal length of galvanized iron would make about sixteen deckloads or sixteen skipfulls. In most instances the use of FLEXOID abolishes raises and cross cuts for ventilation, thus reducing the structural aspect of the ventilation problem to one of extreme simplicity.

All the facts in regard to reducing production costs and eliminating lost time with FLEXOID tubing are contained in the booklet, "BETTER VENTILATION—LOWER PRODUCTION COSTS," which will gladly be sent upon request.

FLEXOID TUBING FOR MINE VENTILATION

SPECIFICATIONS AND PRICES.

Dia. in.	Tubing Prices		Price Couplings Each	Blasting Sections per foot	Shaft Suspension Collars Price Each	Nipples Price Each	Y'S Price Each	T'S Price Each	L'S Price Each	Reducers	Price Each	Flexoid Fabric in 100 ft. rolls Double Coated	
	Wt. per 100 Ft. lbs.	Price per 100 Ft.										Width Inches	Price Per Foot
8	50	\$30.00	\$.50	\$.35	\$.65	\$3.75	\$15.25	\$18.00	\$9.50	12-in. 8-in.	\$3.25	30	\$.23
12	75	40.00	.75	.45	1.00	5.00	17.25	19.00	10.75	16-in. 12-in.	4.25	40	.31
16	100	55.00	1.00	.60	1.25	6.25	20.50	22.50	13.50	24-in. 16-in.	6.25	...	.....
24	125	75.00	1.25	.80	1.75	8.75	25.00	27.50	18.50	.....	....	...	.....

BUFFALO SLIDE-PATTERN BLAST GATES

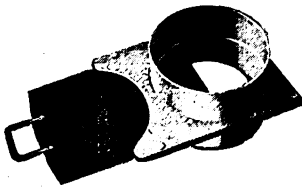


FIG. 1555

Blast gates are necessary in every branch outlet of a blow-pipe system. They save handling useless air, thereby reducing the power consumption and increasing the efficiency of the system, since the suction is increased in the remaining branch pipes when those not in use are shut off. It is essential for maximum efficiency that the blast gates be of adequate size in order that minimum resistance may be offered to the passage of the air. The frames of these gates are of heavy cast iron. The slides are of heavy gauge steel.

SPECIFICATIONS AND PRICES

Size	Inside Dia. Inches	Axial Length Inches	Weight Pounds	List Price	Size	Inside Diam. Inches	Axial Length Inches	Weight Pounds	List Price
2	1 3/4	3	1 1/2	.....	16	15 1/4	9 3/4	75	.....
2 1/2	2 1/4	3 1/2	2	.....	18	17 1/2	9 1/4	80	.....
3	2 3/4	4	2 1/2	.....	20	19 1/4	8 1/4	95	.....
4	3 7/8	5 1/4	6	.....	24	23 1/2	9 3/4	120	.....
5	4 3/4	5 3/4	7	.....	26	25 1/2	Built up of angle irons and steel plate	150	.....
6	5 3/4	7	11	.....	30	29 1/2		205	.....
8	7 7/8	8 1/4	25	.....	36	35 1/2		280	.....
10	9 5/8	9	31	.....	42	41 1/2		350	.....
12	11 1/2	9	36	.....	48	47 1/2		460	.....
14	13 1/2	8 1/4	45	.....				

Note: The sizes indicate outside diameter of collar of gates over which the pipe fits.

BREEZO FAN

NOISELESS—16-INCH FAN—SIX SPEEDS

Removes 1,000 cubic feet of air every minute. That means you get 1,000 cubic feet of pure fresh air—not air simply stirred up—into your rooms, every minute.

It will remove the noxious fumes of paints, oils, varnishes, and other finishing materials.

Will remove foul air or excessive heat from lavatories, engine rooms, kitchens and restaurants.

Improves the efficiency of the men working in factories by removing dust, lint, steam, and overheated air—this means more and better work.

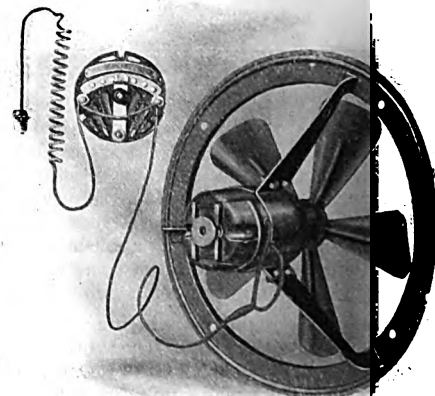
In hotels, restaurants, department stores, theaters and other public places, Breezo will help you to increase patrons and profits.

The motor is variable speed, totally enclosed and dust-proof. It will operate on any 110 or 220 volt circuit, D.C., or A.C. single phase, 25, 30, 40, 50 or 60 cycle. Light weight and economical. Supported by pressed steel tripod which offers minimum resistance to flow of air.

Easily installed—no wiring necessary. Price includes speed controller (six speeds). Cord and plug for any light socket included.

Speed 500-1,000 R.P.M. Capacity 1,000 cubic feet.

Weight, 20 lbs. List Price



BUFFALO PULLEY PROPELLER FAN



FIG. 4090

The Buffalo Propeller Fan has a larger capacity for its size than disk fan types, and is therefore recommended where the available space is small.

The angle and curvature of the blades cause air to be delivered without the usual back draft through the center of the fan, even against maximum resistance. The important point aimed at—uniform velocity of the air over the entire area—has been gained with singular success. Perfect alignment of the blades at the outer edge and absence of vibration is secured by rigidly attaching the entire width of the broad blade at this end to the steel ring. The straight side of each vane is similarly re-enforced by a steel bar, which is fitted at each end into the hub and ring like a spoke. This gives superior strength to the fan just where it is needed.

SIZES AND CAPACITIES

Size	Normal Speed	Cubic Feet Air per Minute	H. P.	Size of Pulley	Weight Lbs.	List Prices
18	1050	2600	.18	4x2	75	.....
24	800	4800	.45	4x2	100	.....
30	650	7500	.75	6x2 $\frac{3}{8}$	175	.....
36	525	10400	.95	7x3	240	.....
42	450	14100	1.3	8x3 $\frac{1}{2}$	325	.....
48	400	18700	1.8	9x4	450	.....
54	350	23300	2.2	9x4	575	.....
60	320	29400	2.9	10x5	640	.....
72	265	42000	3.9	12x5 $\frac{1}{2}$	825	.....
84	225	56800	5.25	14x6	1000	.....

BUFFALO PULLEY DISK FANS

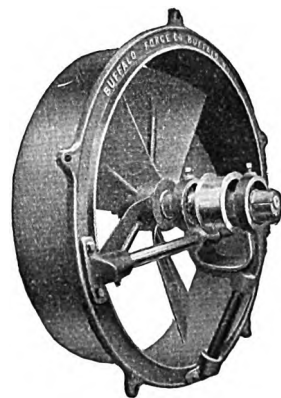
By an ingenious system used only in the construction of the "Buffalo" fans, an exceptionally fine balance of the wheel is obtained, so that they will run at very high speeds without vibration, smoothly and noiselessly.

All sizes, up to and including 48 inch diameter, are now made with the bearings on one side only.

This avoids the troublesome and dangerous practice of reaching through the fan blades to oil up.

The bearings are of the improved "Buffalo" oil ring type, extra long, babbitted, and with oil grooves which distribute the oil evenly over the entire wearing surface.

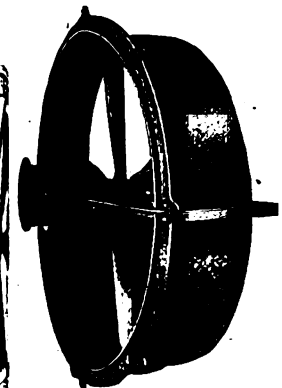
With the fan running continuously at high speeds, these bearings remain cool and require but an occasional re-oiling. The oil reservoirs are made of ample size with that end in view.



BEARINGS ON SAME SIDE OF FAN, SIZES 18 TO 48 INCHES
FIG. 4091

SIZES AND CAPACITIES

Size	Normal Speed	Cubic Feet Air per Minute	H. P.	Size of Pulley	Weight Lbs.	List Prices
18	1050	2200	.13	4x2	75	.....
24	800	4100	.24	4x2	100	.....
30	650	6500	.4	6x2 $\frac{3}{4}$	170	.....
36	525	9100	.5	7x3	230	.....
42	450	12300	.7	8x3 $\frac{1}{8}$	325	.....
48	400	16300	.95	9x4	445	.....
54	350	20400	1.2	9x4	560	.....
60	320	25600	1.5	10x5	630	.....
72	265	36600	2.1	12x5 $\frac{1}{2}$	820	.....
84	225	50500	3.0	14x6	990	.....



PLAIN BEARINGS, OVERHUNG PULLEY, SIZES 54 INCHES AND UP
FIG. 4092

BAKER POSITIVE PRESSURE BLOWER OR VACUUM PUMP TYPE A

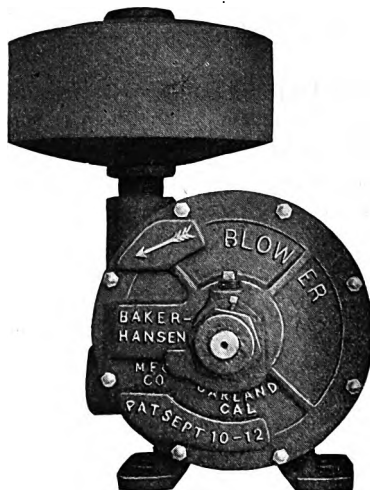


FIG. 1562

The general construction and operation is the same as the type R pumps except the bearings, which are a part of each cover using a chain to carry oil from well to shaft bearings. Built for pressures up to one pound; will pull 26 inches of vacuum for intermittent service. Order by number and letter.

All Baker Rotary Vacuum Pumps are universally used for priming pumps and pipe lines. Positive, continuous displacement—vacuum up to 26 inches and 29 inches.

Water must be kept out of these machines when used for priming. This can be done in several ways:

Use receiver or vacuum tank as follows:

Tower the air line from a point to prime 30 feet vertically. Return this line to connect at side of receiver or tank. Then connect the suction of vacuum pump to the top of this receiver, providing in this line between the vacuum pump and receiver suitable valve or pipe plug which may be opened to put oil in the primer from time to time. Place a drain at the bottom of this receiver which should be drained before each priming.

By paying close attention while priming, towering the line may be omitted. Be sure to drain receiver after each priming.

Any other means of trap may be used which will at all times prevent water entering the primer. If water is kept out of the primers at all times there should be no cause for replacing parts. In selecting a suitable size primer it is advisable to use one of sufficient capacity to prime quickly, especially if the plain type of primer is used. If the water cooled primer is used, it does not matter how long it runs.

To determine suitable size and approximate time to prime, we suggest the following:

Find the cubic feet of air necessary to displace. For example, say 100 cubic feet of air to remove with a lift of 15 feet using a primer with 100 cubic foot capacity per minute it would require approximately two minutes, assuming that all valves and the line are tight.

SYPHONS

On syphons where it is desirous to maintain the service under a vacuum at all times, we recommend the water cooled vacuum pumps which may be run constantly at high vacuum.

SPECIFICATIONS AND PRICES

Machine No.	Capacity Cu. feet free Air per min.	H. Power at 1 lb. Pressure	H. Power at 1 lb. R. P. M.	Size Suction and Discharge	Standard Pulley Size	Approximate Weight	Price Less Pulley	Extra for Single Pulley	Extra Tight and Loose Pulleys
O	14 cu. ft. 1800 R.P.M.	$\frac{3}{4}$ H. P.	at 1800 1 H. P.	1"	5"x2"	40 lbs.	\$56.00	\$6.65	\$14.00
1 A	28 cu. ft. 1200 R.P.M.	1 H. P.	1200 2 H. P.	1"	5"x2"	75 lbs.	80.00	6.65	14.00
2 A	38 cu. ft. 1200 R.P.M.	1 H. P.	1200 2 H. P.	1½"	5"x2"	90 lbs.	100.00	6.65	14.00
3 A	60 cu. ft. 1200 R.P.M.	2 H. P.	1200 3 H. P.	1½"	5"x4"	110 lbs.	140.00	7.35	14.65
4 A	120 cu. ft. 1200 R.P.M.	3 H. P.	1200 4.2 H. P.	2"	5"x4"	145 lbs.	196.65	7.35	14.65
5 A	225 cu. ft. 1200 R.P.M.	5 H. P.	1200 10 H. P.	3"	10"x5"	250 lbs.	374.00	10.00	19.35

All A Machines for 1 lb. constant service, or vacuum up to 26 in., intermittent service, shipped with Domes, less pulleys, unless ordered differently.

BAKER POSITIVE PRESSURE BLOWER OR VACUUM PUMP

TYPE R

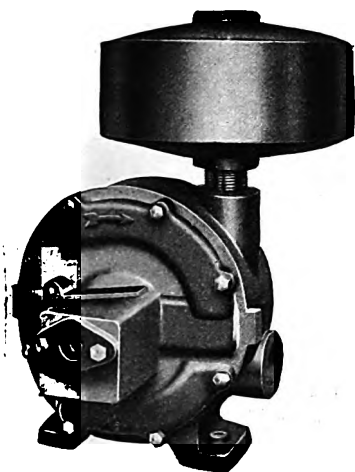


FIG. 1563

The No. 3R is capable of maintaining a pressure of 5 pounds or 10-inch vacuum constant service or 26-inch vacuum intermittent service. This type of pressure blower or vacuum pump is fitted with outside ring oil bearings similar to a motor bearing. The overflow oil cups show when proper amount of oil is in bearing well. The blades or vanes are of a special composition and operated by means of equalizing ports. These machines give a positive, even delivery, the capacity being reduced in proportion to the speed reduction when run at less than maximum rated speed.

These blowers or vacuum pumps, owing to their range of speed, are well suited for direct connection by means of flexible coupling. They are used for all classes of air or gas pumping, also vacuum cleaning; in fact any service where a given amount of air is to be handled at a stated pressure or vacuum.

When it is desired to handle special gases it will be necessary to give us complete information so that we can recommend a proper size and suitable machine to meet the special service most satisfactorily.

All Baker Blowers and Vacuum Pumps are unexcelled for priming centrifugal pumps and pipe lines, for foundries, gas fires, forges, oil burners, blow pipes, braziers; in fact every conceivable use where dependability for service, either pressure or vacuum, is required.

WATER COOLED TYPE

This type of machine is the same construction as the type R with the exception that it is made with water jackets and is capable of handling pressures up to 10 pounds maximum or 29-inch vacuum on constant 24-hour service.

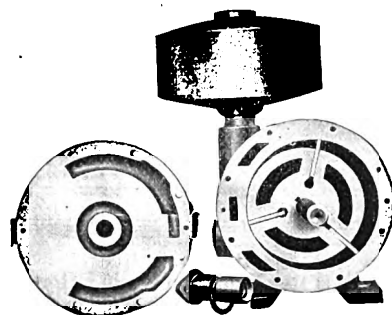


FIG. 1564

WITH COVER REMOVED

SPECIFICATIONS AND PRICES TYPE R

Machine Number	Capacity Cubic feet free air per min.	R. P. M.	Horse power at 5 lbs. pressure	Horse power at 10 lbs. pressure	Horse power at 26 in. vac. In- termittent service	Size Suction and dis- charge pipe thread	Stand- ard Pulley size	Approx. Weight lbs.	Price Less Pulley	Extra for Single Pulley	Extra for Tight and Loose Pulleys
½ R	7	1200	¼	.....	½	½"	6"x1"	40	\$66.65	\$6.65	\$14.00
1 R	28	1200	1	.....	2	1"	5"x2"	80	96.00	6.65	14.00
2 R	38	1200	1.5	.....	2	1½"	5"x2"	100	112.65	6.65	14.00
3 R	62	1200	2	.....	3	1½"	5"x4"	120	152.65	7.35	14.65
4 R	120	1200	4	.....	5	2"	5"x4"	185	220.00	7.35	.....
5 R	225	1200	5.2	.....	7.5	3"	10"x5"	300	414.00	10.00	19.35
6 R	310	800	10	.....	15	3"	12"x6"	550	460.00	12.00	24.00
7 R	450	1200	10	.....	15	4"	12"x6"	1000	766.65	12.00	24.00

WATER COOLED TYPE

3WC	60	1200	.....	2½	3	1½"	5"x4"	150	\$246.65	\$7.35	\$14.65
4WC	120	1200	.....	5	5	2"	5"x4"	225	333.35	7.35	.....
6WC	310	800	.....	10	10	3"	10"x5"	750	766.65	10.00	19.35
7WC	450	1200	.....	15	15	4"	12"x6"	1500	1266.65	12.00	24.00

Order by number and letter. All blowers and vacuum pumps are shipped with standard pulleys unless otherwise ordered. When ordering give full working conditions, and if for vacuum or pressure. All Type R machines can be used at maximum speed and delivery of 5 pounds pressure or 10-inch vacuum, constant 24-hour service. For intermittent service they can be run for 26-inch vacuum.

BAKER NOISELESS AIR COMPRESSORS

STANDARD SIZES FOR 175 LBS. PRESSURE

Baker Rotary Noiseless Air Compressors meet with success everywhere for efficiency, durability, economy of operation and perfect performance under most exacting conditions. All Baker Rotary Compressors are fitted with oil trap and separator, which insures dry air. From this oil trap or dome the oil returns automatically to the sliding vanes, which furnishes perfect lubrication and seal at all times. No adjustments to be made. No springs, no mechanically operated parts.

Standard sizes good for 175 pounds pressure. Compressors for higher pressures furnished. Specifications will be furnished upon request stating full working conditions.

All Baker Rotary Compressors can be run at any pressure up to the maximum. Special machines of larger capacity furnished to order.

Where the service is such that a given pressure is desired to be maintained without attention of operator, we equip any size compressor with suction unloader which can be adjusted to maintain the desired pressure.

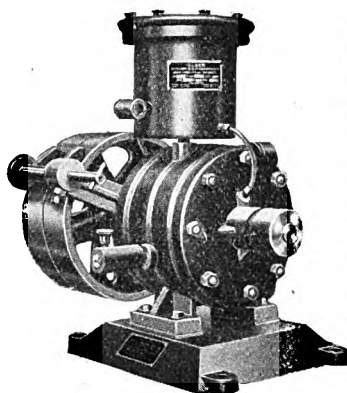


FIG. 5007

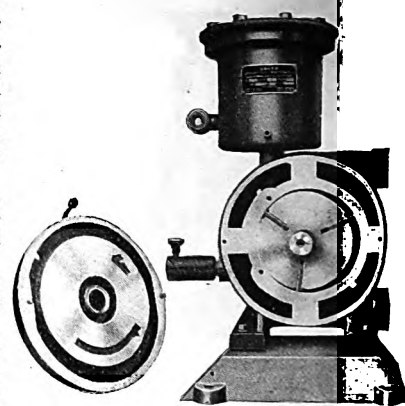


FIG. 5008

SPECIFICATIONS AND PRICES

No.	Speed Rev. per minute	Capacity cu. ft. free air per min. at rated speed	Horse Power at 100 lbs.	Approximate floor space. with T. & L. P.	Approximate Weight	Size Pulley	LIST PRICES	
							Single Pulley	Tight & Loose Pulley with Shifter
3B	650	3	1	16"x12"	80 lbs.	10"x2"	\$ 83.35	\$ 92.65
6B	625	6	2	17"x13"	105 lbs.	10"x2"	113.35	124.00
9B	625	9	3	20"x15"	185 lbs.	12"x2½"	173.35	184.00
15B	550	15	4	20"x15"	210 lbs.	14"x3"	206.65	220.00
20B	550	20	5	27"x20"	325 lbs.	20"x4"	281.35	304.00
30B	575	30	7½	32"x24"	500 lbs.	24"x5"	397.35	430.65

These compressors pull a perfect vacuum in constant service when used for this work.

Write us your requirements on high vacuum work. Other sizes on application.

We furnish automatic control for motors. Give kind of current, phase, voltage and horse power.

WATER COOLING TANKS

FOR INTERMITTENT SERVICE

All Baker High Pressure Compressors are water cooled. For intermittent service we can furnish tanks for Compressors Nos. 3B, 6B, 9B, 15B. For service where the runs are of long duration, a forced circulation should be used.

	Price
Cooling Tank for No. 3B.....	\$6.65
Cooling Tank for No. 6B.....	10.00
Cooling Tank for No. 9B.....	12.00
Cooling Tank for No. 15B.....	12.00

BAKER NOISELESS AIR COMPRESSORS

SPECIAL MOUNTING

We furnish any size compressor mounted on cast-iron base with special drive, thus saving the customer the necessity of making assembly.

Mountings consist of cast-iron base, bracket with idler and pulley, endless leather belt—circulating tank attached. To the price of mounting add price of compressor and motor. Let us know the class of work you desire and we will recommend suitable equipment. Always advise kind of current, voltage, phase, etc.

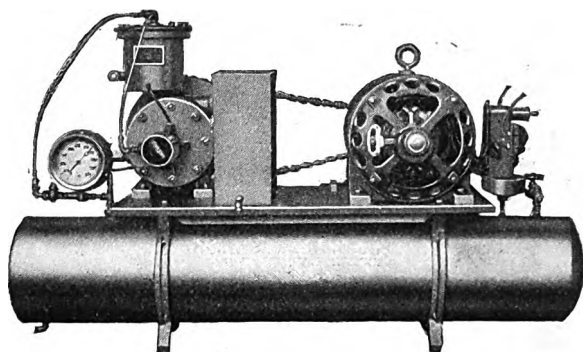
	Price
Special Mounting for No. 3B Compressor.....	\$40.00
Special Mounting for No. 6B Compressor.....	48.00
Special Mounting for No. 9B Compressor.....	60.00
Special Mounting for No. 15B Compressor.....	64.00
Special Mounting for No. 20B Compressor.....	73.35
Special Mounting for No. 30B Compressor.....	80.00

ROTARY AUTOMATIC AIR UNITS

V BELTED

This cut shows how the Nos. 3B, 6B and 9B Compressors can be furnished mounted on tank complete with motor. Units are fitted with automatic pressure unloaders, allowing motor to start with idle compressor at all times. There is nothing to do but connect the electric power wires—the outfit does the rest. Complete unit consists of compressor and cooling tank, with cast-iron mounting, motor, pressure gauge, special check valve, pop safety valve, pressure control switch, automatic unloader and shut-off service valve. Link V Belt Drive.

When ordering give kind of current, voltage and cycles.



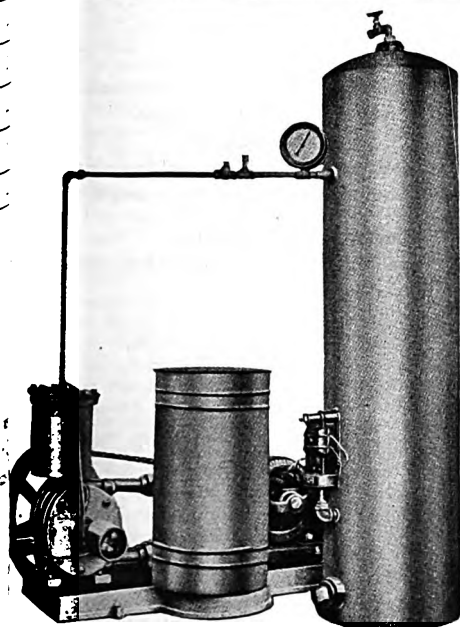
NOS. 3, 6 AND 9—FIG. 5009

Unit No.	R.P.M.	Cubic Feet Per Minute	Working Pressure	Motor H. P.	Size of Tank	Floor Space	Shipping Weight Pounds	Price		
								Alternating		Direct Current
								Single Phase	3 Phase	
3	650	3	150	$\frac{3}{4}$	12x60	14"x60"	550	\$400.00	\$400.00	\$453.35
6	625	6	175	2	12x60	14"x60"	740	533.35	486.65	593.35
9	625	9	175	3	12x60	14"x60"	850	660.00	653.35	720.00

LARGE UNITS

This cut shows the general construction of the larger air units. All units are fitted with a special unloading device attached to the compressor shaft, which unloads all pressure on the compressor when it is stopped from any cause. Does not depend on the action of the electric motor or controller—works independent with the compressor at all times, allowing the motor to always start compressor without load. This automatic air unit can be made up in any size to fit your needs. Can be furnished with either flat or V belt drive.

Air receivers conform to all requirements of the Industrial Accident Commission of the State of California. When ordering give kind of current, voltage and cycles.



NOS. 15 AND 20—FIG. 5010

Unit No.	R.P.M.	Cu. Ft. Per Minute	Working Pressure	Motor H.P.	Size of Tank	Floor Space	Shipping Weight Pounds	Price		
								Alternating		Direct Current
								Single Phase	3 Phase	
15	550	15	175	5	14"x48"	16"x48"	1000	\$760.00	\$680.00	\$813.35
20	550	20	150	5	18"x72"	22"x60"	1500	956.00	813.35	996.00

THE KINGSTON AIR COMPRESSOR

The Kingston Air Compressors are constructed of the very best materials obtainable, and are fitted with the utmost care and attention by expert and skilled mechanics. They are strictly modern and up-to-date, and contain numerous features of advanced pneumatic machinery construction that cannot be found in any other make. All machines are subject to a severe factory test and inspection before shipment. The purchaser of a "Kingston" can rest assured that it is exceptionally efficient and most economical.

The Valve of any Compressor governs its true measure of efficiency. It is the heart of the Compressor. Recognizing

this fact the manufacturers invented the Kingston Valve which is the perfection of Air Valves. With this Valve you can get the full force of every stroke of the piston.

The Bearings of the "Kingston" are die-cast and are renewable. They are made of special process white bearing metal that resists wear. Lubrication is of the Splash System. The "Kingston" is made with an enclosed base. This is dust proof and with no oil leakage. Oil is put into the crank case and kept to a certain level. By removing the crank-case cover the connecting rod boxes may be easily adjusted. It is not necessary to even touch the pipe connections.

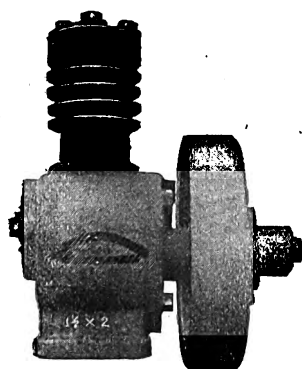


FIG. 1572
1 1/2 x 2 AIR COOLED

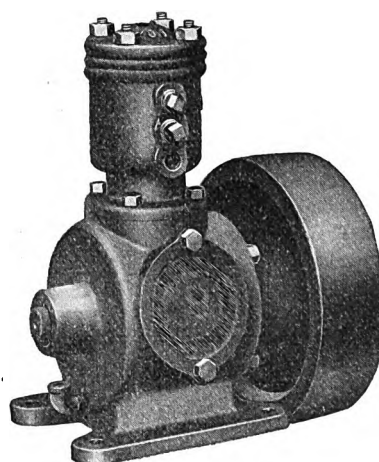


FIG. 1571
2 x 2 1/2 WATER COOLED



FIG. 1570
3 x 3 1/2 AIR COOLED

1 1/2 x 2 AIR COOLED

This model is a high speed compressor, designed and built to run at 1000 R. P. M. At that speed it will deliver one and one-half cubic feet of free air per minute. A machine well adapted for operating small spray-brush outfits, small service stations, etc.

2 x 2 1/2 AIR AND WATER COOLED

For continuous working pressure of 100 lbs. we would

advise the water cooled. A machine of wonderful efficiency delivering 2 1/2 cubic feet of free air per minute.

3 x 3 1/2 AIR COOLED

This machine delivers eight cubic feet of free air per minute. A very satisfactory compressor for a continuous pressure of 150 pounds

3 x 3 1/2 WATER COOLED

For a continuous working pressure of 150 pounds we would advise the water cooled.

SPECIFICATIONS AND PRICES

Bore Stroke	Rev. per Minute	Capacity Cubic Foot		Maximum Press.	Horse Power	Pulley Diameter	Weight on Skids	LIST PRICES Air and Water Cooled	
		600 R.P.M.	1000 R.P.M.					With Tight Pulley	With Tight & Lock Pulley
1 1/2 x 2	1000	...	1 1/2	125	1/2	7 in.	18 lbs.	\$34.00	\$37.00
2 x 2 1/2	450-600	2 1/2	...	200	1-2	8 in.	30 lbs.	46.00	51.00
2 1/2 x 3	450-600	5	...	200	1	10 in.	65 lbs.	60.00	67.00
3 x 3 1/2	450-600	8	...	225	2	14 in.	150 lbs.	100.00	114.00

THE KINGSTON GARAGE AND STATION UNITS

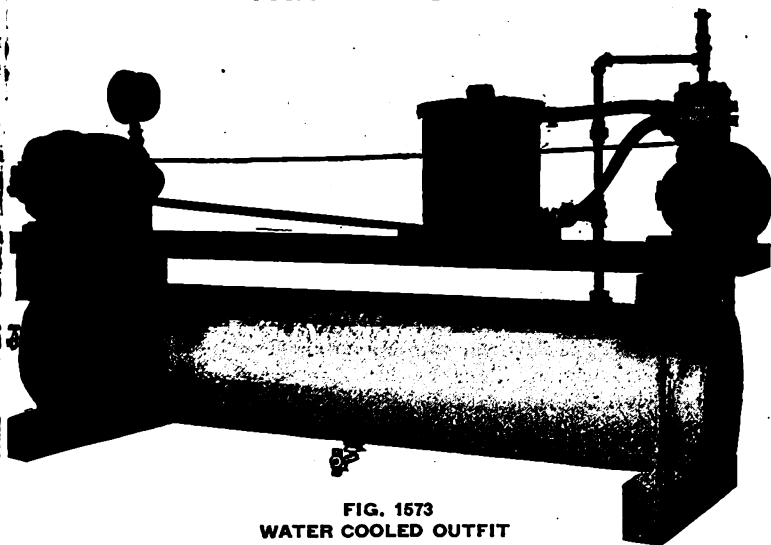


FIG. 1573
WATER COOLED OUTFIT

AIR AND WATER COOLED OUTFIT FOR GARAGES

This outfit is designed to meet the exacting requirements of Garages where 25 or more cars are kept or where the air is piped to outlets more than 100 feet distant.

"Kingston" Air or Water Cooled Compressor.
General Electric Motor. The "Kingston" Pop Safety Valve.
Pressure Gauge. 25 feet Wire Wound Hose.
Romort Automatic Valve.

Air tanks on these outfits conform to all requirements of the Industrial Accident Commission of the State of California.

AIR OR WATER COOLED STATION SET

The ideal pumping unit. Complete in every respect; used extensively in Filling Stations for the inflation of tires, cleaning engines, etc. Automatic pressure switch furnished if desired.

SPECIFICATIONS AND PRICES

2x2½ "Kingston" Air or Water Cooled Compressor.

½ H. P. General Electric Motor. Type R, S. A.

The "Kingston" Pop Safety Valve.

Pressure Gauge.

25 feet Wire Wound Hose.

Romort Automatic Valve.

12x60 Air Receiver made of 3-16 inch steel with ¼ inch head, beveled and welded.

Above Outfit Complete.....List Price \$233.00

Automatic Pressure Switch.....List Price 30.00

12x60 Air Receiver made of 3-16 inch steel with ¼ inch head, beveled and welded.

Above outfit complete

with 2½ x 3-inch compressor and 1 H.P. Motor.... \$300.00

with 3x3½-inch compressor and 2 H.P. 3 Phase

Motor..... 334.00

Extra for Automatic Pressure Switch..... 30.00

UNITED STATES "TWO-STAGE" AIR COMPRESSOR

DE LUXE (4 CU. FT.) AUTOMATIC

This outfit consists of a Two-Stage Automatic Air Compressor, ¾ H. P. Motor (for any kind of current), Automatic Electric Controller, 30-gallon Steel Tank, Automatic Pressure Release, 250-lb. Gauge, U. S. Leakproof Check Valve, Needle Point Valve, Filtering Trap, Safety Valve, Intake Silencer and V Belt. (Does not include Hose, Cord or Plug.)

The Intake Silencer muffles the undesirable intake sound and tends to force air into the intake valve. A trap is provided in the starting tank which extracts any moisture or oil that may be discharged from the compressor, assuring pure, dry air, free from oil.

This outfit is equipped with extra tank, the function of which is to permit the motor to start against no pressure and attain full momentum before assuming its full load, thereby eliminating the cause of burned out motors and other motor trouble. When the air in the main tank is raised to the proper pressure the automatic switch stops the motor and operates the automatic pressure release which opens starting tank to the atmosphere. When the automatic switch again starts the motor it also closes the pressure release and the compressor begins pumping against no pressure. It always starts without strain. When the air in the starting tank attains a pressure slightly in excess of that in the main tank (requiring about 10 seconds), it opens the check valve and charges this tank until the proper pressure is reached, when the operations are repeated.

The safety valve automatically prevents overcharging of the tank. It may be adjusted to open at any desired pressure.

The U. S. AUTOMATIC CONTROL (accepted by the Board of Underwriters) is very simple in construction and contains no rubber diaphragms to develop leaks, jump valves, platinum points or springs to get out of order. It automatically maintains the desired pressure in the storage tank without any attention whatsoever, and can be adjusted to any pressure.

With this U. S. AUTOMATIC you are always assured of ample air for any occasion. Air Tank meets requirements of Industrial Accident Commission of State of California.

The motor is mounted on a sliding base, so any slack which develops in new belts may be taken up by simply adjusting a

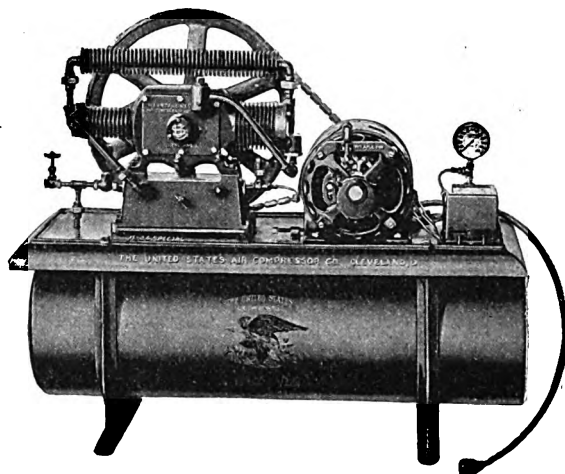


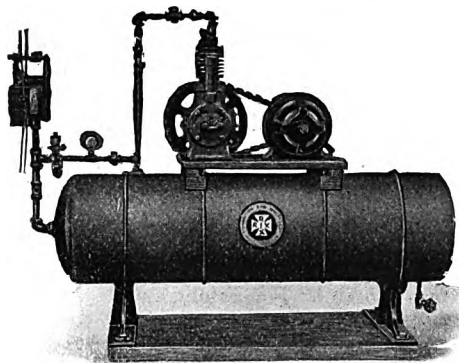
FIG. 1574

screw. The belt is of V type construction—each link is a master link, so one link may be added or dropped:

SPECIFICATIONS AND PRICES

Size of Compressor Cylinder.....	3"x1½"
R. P. M. of Compressor.....	325
Cubic Feet per Minute.....	4
Working Pressure... 150 lbs. V Belt.....	5/8"
H. P. of Motor.... ¾	Floor Space..... 18"x50"
Size of Tank..... 14"x48"	Shipping Wgt.... about 500 lbs.
Model H 34 U. S. Two-Stage Air Compressor, complete less Hose, Cord or Plug. Price each.....	\$320.00

RIX SENIOR FREE AIR UNIT



NOS. 33, 34 AND 35—FIG. 5057

These single stage units are combinations of the Gardner air cooled splash lubricated compressors and 14 x 48 inch air receivers built to conform to all requirements of the Industrial Accident Commission of the State of California. Drive is by link V belt and construction is of iron and steel. These outfits can be equipped with a simple automatic pressure release to enable the motor to start up against no pressure.

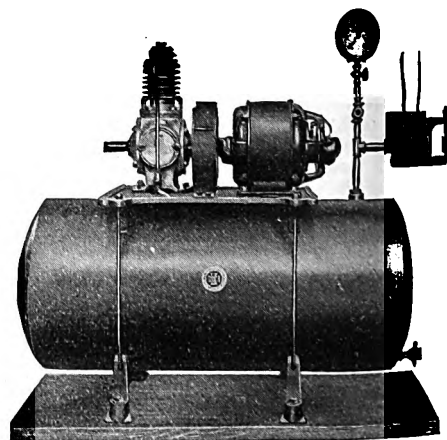
Equipment of above outfits is complete and includes oil gauge for compressor, special check valve, automatic pressure regulator, drain cock for receiver, pressure gauge, air cock for testing purposes, Rix No. 30 pop valve, necessary pipe and fittings, and 25 feet wire wound air hose with Romort fire valve. Single phase motors for alternating current furnished. Direct current motor furnished when necessary.

When ordering give kind of current, voltage and cycles.

Unit No.	Compressor Size	R.P.M.	Cubic Feet per Minute	Working Pressure	Motor H.P.	Floor Space Inches	Shipping Weight Lbs.	Price		
								Alternating		Direct Current
								Single Phase	3 Phase	
33	2 x 1¼	500	1¼	150	¼	54 x 18	300	\$215.00	\$215.00	.....
34	2 x 2½	400	2½	150	½	54 x 18	375	235.00	235.00	.....
35	2½ x 3	400	5	150	1	54 x 18	465	285.00	285.00	.....

RIX GEARED FREE AIR UNIT

These units are combinations of the Gardner air cooled splash lubricated compressors and 16 x 36 inch air receivers built to conform to all requirements of the Industrial Accident Commission of the State of California. This is an all iron and steel construction, and is very substantial. When ordering give kind of current, voltage and cycles.



NOS. 54, 55 AND 56—FIG. 5058

Unit No.	Compressor Size	R.P.M.	Cubic Feet per Minute	Working Pressure	Motor H.P.	Floor Space Inches	Shipping Weight Lbs.	Price		
								Alternating		Direct Current
								Single Phase	3 Phase	
54	2 x 1¼	500	1¼	150	¼	16 x 36	300	\$225.00	\$225.00	.....
55	2 x 2½	400	2½	150	½	16 x 36	375	245.00	245.00	.....
56	2½ x 3	400	5	150	1	16 x 36	465	290.00	290.00	.....

AIR RECEIVERS

CONFORM TO ALL REQUIREMENTS OF THE INDUSTRIAL ACCIDENT COMMISSION OF THE STATE OF CALIFORNIA
MADE OF HEAVY WELDED STEEL

Each tank is equipped with two ½-inch and two ¼-inch standard openings.

Size Inches	Gauge No.	Capacity Gallons	Pressure Pounds	Weight Pounds	Price
10x24	10	8	150	40	\$ 27.00
10x36	10	12	150	60	30.00
12x24	8	11	160	52	30.00
12x36	8	17	160	78	35.00
12x48	8	23	160	103	40.00
12x60	8	29	160	130	42.00
14x36	7	20	150	96	36.00
14x48	7	27	150	126	48.00
14x60	7	34	150	160	48.00
16x48	7	42	130	152	48.00
16x60	7	53	130	190	54.00
16x72	7	62	130	227	59.00
18x48	¼	52	200	182	66.00
18x60	¼	65	200	225	74.00
18x72	¼	78	200	270	81.00
20x60	¼	81	175	260	85.00
20x72	¼	95	175	312	94.00
24x60	¼	115	145	385	104.00
24x72	¼	138	145	462	120.00

Larger sizes on application.



FIG. 1569

AIR VALVES AND PUMP CONNECTIONS

THE "KINGSTON" AIR POP SAFETY VALVE

The Kingston Air Pop Safety Valve is designed for a working pressure up to 250 pounds. It is a positive relief valve, air tight, and has a free discharge of about three per cent.

Makes a loud and distinct "pop" and can be regulated to the exact pressure desired.

It is made of brass, and furnished with one-quarter inch pipe thread.

Price, each..... \$4.50



FIG. 1586

WESTINGHOUSE LEAKLESS FILLING VALVE

Specially designed for use in inflating automobile tires, and made exceptionally heavy so as to withstand the rough usage to which a device of this kind is subjected.

Air tight connection with tire valve is made by a rubber gasket. Inlet end of valve is ¾" I.P. thread. This is a very quick and handy valve to operate.

List Price each

Valve complete..... \$5.00
Knurled nut..... .50
Rubber gasket, per doz..... .25

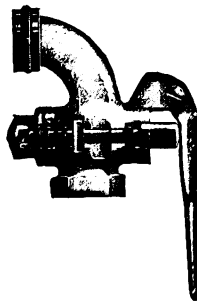


FIG. 1589

ROMORT AUTOMATIC AIR VALVE STYLE B



FIG. 1588

The Romort Automatic Air Valve, Style "B," is a high grade air valve made to meet the popular demand for a light and inexpensive automatic air device. Solid bronze, one piece casting, universal stem to fit any size tubing. Automatic in opening and closing, guaranteed air tight. All parts interchangeable. Weight, 5 ounces.

Price, each..... \$1.00

ROMORT ANGLE PUMP CONNECTION NOT AUTOMATIC

The Romort Angle Pump Connection is not automatic and is made for air compressors of all types, including power, foot and spark plug pumps attached to automobiles. Extra heavy solid bronze casting built to withstand constant service. Unequaled for Vulcanizing and Repair Shops where automatic air connections are not required. Stem fits any size tubing from one-eighth to three-eighths inch. Fitted with Genuine Romort Rubber Washer.

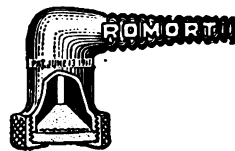


FIG. 1590

Price, each..... \$0.40

AIR VALVES, PUMP CONNECTIONS AND ENGINE CLEANERS

ROMORT AUTOMATIC AIR VALVE STYLE A

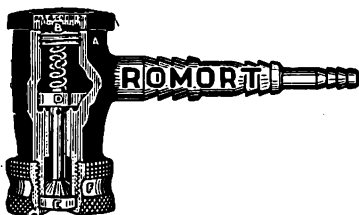


FIG. 1587

THE MASTER VALVE FOR FREE AIR STATIONS—STANDS HARD, ROUGH USE AND ABUSE

The most popular valve for heavy work. Solid bronze, practically indestructible. The new step-up stem fits any size rubber tubing from one-quarter to one-half inch. Special stems can be furnished to fit any style metallic hose. All parts (except rubber gasket) guaranteed to wear one year without repair or replacement. Instantaneous in opening and closing, positively air tight. Impossible for users to waste air. Weight, 9 ounces.

Price, each..... \$3.00

ROMORT STRAIGHT PUMP CONNECTION NOT AUTOMATIC

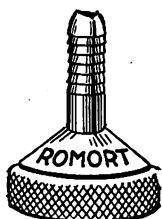


FIG. 1591

Made of solid bronze, one-piece casting designed for use on direct connected air pumps. Made with one-quarter inch stem, especially for use on hand or foot pumps, but special stems can be furnished on quantities of one thousand or more. When connected to tire valve it will not leak or blow off.

Price, each..... \$0.20

ROMORT ENGINE CLEANER



FIG. 1592

This device has no equal for cleaning the dirt and grease from automobile engines. A child can operate it, yet it does its work with a thoroughness that will satisfy the most exacting. Holds two quarts of fluid—common coal oil is best. With the long spout the operator reaches every nook and corner of the machinery—almost impossible with the old method of rags and waste. Price, each..... \$3.50

BINKS CLEAN-ALL AIR GUN

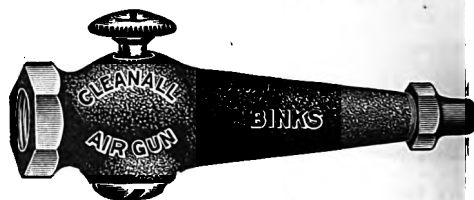


FIG. 1593

Indispensable for blowing dust from motors, machinery, automobile cushions, etc., used to equal advantage for removing chips and filings where it is impossible to reach with a brush.

The air is in constant control at all times by the operator and desired volume can be obtained by simply pressing the button.

Pipe Connection	Orifice of Discharge	Price Each
1/8-inch	1/8-inch	\$1.50
1/4-inch	1/4-inch	1.65
3/8-inch	3/8-inch	1.90
1/2-inch	1/2-inch	2.50
3/4-inch	3/4-inch	3.25

HOSE COUPLINGS

SHERMAN

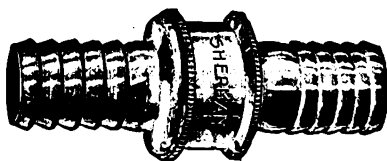


FIG. 1581

WOLF STEAM

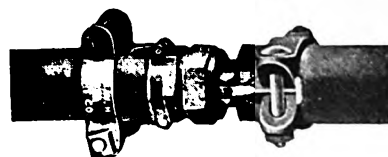


FIG. 1582

Stamped wrought brass, with Pacific Coast hose thread.
For hose, inch..... 1/2 5/8 3/4
Weight doz., lbs..... 13 1/2 1 1/2 2
Price per dozen..... \$4.40 \$4.40 \$4.40

For hose, inches..... 1/2 3/4 1 1 1/4 1 1/2 2
Price per pair..... \$3.40 \$4.00 \$5.00 \$6.00 \$8.00 \$12.00

HOSE COUPLINGS, CLAMPS AND MENDERS

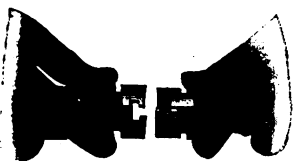


FIG. 4093



FIG. 4094



FIG. 4095

Perfect Hose Couplings are absolutely interchangeable between the various sizes and combinations up to $\frac{3}{4}$ inch inclusive. Each end is identical with the other—no right or left, no male or female—making a universal coupling which requires no reducers. Disconnected instantly by a straight pull on the knurled sliding sleeves. It is not even necessary to twist, as the bevel jaws separate as the locking shoulder moves back. The bevel jaws and locking shoulders are heavy, with large bearing surfaces, and cannot bend, break, jar, or work loose. Heavy, unbreakable sliding sleeves insure extreme durability. The operating spring is large and durable, but can be easily replaced, if necessary, by removing washer. A shoulder is provided on each hose end, so the hose clamp can be used.



FIG. 4096

PIPE ENDS

Can be furnished with either male or female thread. The style and size should always be specified when ordering. Standard pipe threads.



FIG. 4097

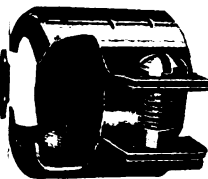


FIG. 4098

PERFECT HOSE CLAMP

Designed especially for fastening hose on Perfect Hose Couplings, which are provided with a shoulder for the purpose. Can also be used for clamping hose on the hose nipple. Two prongs on the hose clamp fit over a shoulder on the Perfect Hose Coupling, while barbs inside the stem grip the hose tight, making it absolutely impossible for it to work loose. It is necessary that a clamp should compress the hose equally all around. This is accomplished in the Perfect by a loose angular piece slipped in between the screw prongs. Being a separate piece, it can be easily removed without spreading the clamp so far apart as to disfigure it. The Perfect has only one screw and one nut, which will securely hold the clamp on hose until the latter is worn out. The rectangular nut can not come loose. It has a lug through which the threaded hole extends, which not only provides for longer bearing surface for the screw, but also permits reversing it, as the space between the screw prongs decreases from tightening, and provides protection for threads on the screw which may protrude.

HOSE MENDER

Consists of a twin clamp constructed on the same principle as the Perfect Hose Clamp, having the same style screw, special nut, etc., forming really two clamps connected with two strong bars, closely fitting the hose. Each clamping end is provided with barbs in the clamps that will securely hold the hose when attached. The center piece consists of a metal tube, smooth on each end or shank, with the shoulder in the middle, as the clamp with its barbs will amply hold the hose. This makes the Mender quickly attachable, and the flange in the center of tube prevents it from going into the hose on either side further than the shoulder. Not having any corrugations, it may be easily detached without injuring core or hose. This Mender, therefore, may not only be used in the usual



FIG. 5000

manner of mending a hose at the place where it has been injured but will also answer as a coupling where two or more lengths of hose are permanently connected, or connected up for some time.

Size Inches	Style Coupling	Price Each
$\frac{3}{8}$	Hose end.....	\$1.00
$\frac{1}{2}$	Hose end.....	1.00
$\frac{3}{4}$	Hose end.....	1.00
$\frac{3}{8}$	Pipe end, male.....	.80
$\frac{1}{2}$	Pipe end, male.....	.80
$\frac{3}{4}$	Pipe end, male.....	.80
1	Pipe end, male.....	.80
$\frac{3}{8}$	Pipe end, female.....	.80
$\frac{1}{2}$	Pipe end, female.....	.80
$\frac{3}{4}$	Pipe end, female.....	.80
1	Pipe end, female.....	.80

Above sizes are interchangeable.

Size Inches	Style Coupling	Price Each
1	Hose end.....	\$2.50
$1\frac{1}{4}$	Hose end.....	2.50
1	Pipe end, male.....	2.25
$1\frac{1}{4}$	Pipe end, male.....	2.25
1	Pipe end, female.....	2.25
$1\frac{1}{4}$	Pipe end, female.....	2.25

Above sizes are interchangeable.

GASKETS

$\frac{3}{8}$ in., $\frac{1}{2}$ in., $\frac{3}{4}$ in. (one size).....	\$0.05
1 in., $1\frac{1}{4}$ in. (one size).....	.10

Size Inches	Clamps Price, each	Mender Clamps Price, each	Menders Price, each
$\frac{3}{8}$	\$0.12	\$0.15	\$0.10
$\frac{1}{2}$	.15	.18	.10
$\frac{3}{4}$	.18	.24	.15
1	.24	.30	.20
$1\frac{1}{4}$	.30	....	....

HOSE COUPLINGS

THREE-PRONG



HOSE TO HOSE—FIG. 5001

HOSE TO PIPE (MALE PIPE END)
FIG. 5002HOSE TO PIPE (FEMALE PIPE
END)—FIG. 5003

These couplings have been on the market for a number of years, and many shops are equipped with them. To those users desiring to add to this equipment, we are prepared to furnish hose or pipe ends in the same sizes as heretofore.

Specify "3-Prong Type" when ordering this style, so it will not be confused with the Perfect Hose Coupling.

Size Inches	Style Coupling	Price Per End
$\frac{3}{8}$	Hose end.....	\$0.60
$\frac{1}{2}$	Hose end.....	.60
$\frac{3}{4}$	Hose end.....	.60
1	Hose end.....	.60
$\frac{3}{8}$	Pipe end, male.....	.60
$\frac{1}{2}$	Pipe end, male.....	.60
$\frac{3}{4}$	Pipe end, male.....	.60
1	Pipe end, male.....	.60
$\frac{3}{8}$	Pipe end, female.....	.60
$\frac{1}{2}$	Pipe end, female.....	.60
$\frac{3}{4}$	Pipe end, female.....	.60
1	Pipe end, female.....	.60
	Gaskets all one size.....	.05

BOWES

Bowes Couplings, sizes $\frac{1}{4}$ ", $\frac{3}{8}$ ", $\frac{1}{2}$ " Hose or Pipe ends are interchangeable and take same size Gasket.

Hose Ends are provided with a Groove to permit use of the Never Slip Hose Clamp which attaches hose to coupling securely.

Bowes Coupling Ends are automatically connected and locked by means of a sliding sleeve which engages a locking slot in opposite coupling end.

Couplings are disconnected by withdrawing sleeve from Locking Slot of opposite coupling end, and revolving the sleeve end a quarter turn.



FIG. 1575

Size	$\frac{1}{4}$ "	$\frac{3}{8}$ "	$\frac{1}{2}$ "
Male End only, (either hose or pipe,) price ea.	\$0.80	\$1.00	\$1.20
Female " " " " " " " " " "	.80	1.00	1.20
Bowes Hose Clamp, price per pair.....	.50	.50	.50
Bowes Coupling complete for each end of hose.....	2.10	2.50	2.90

HOSE CLAMP TOOL

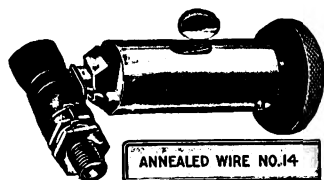


FIG. 1580

Adapted to all kinds of hose, air, water, steam, gas, oil.

If you prefer wire clamps on your hose they can be applied very quickly and securely by using this Hose Clamp Tool.

Price each.....	\$3.2
Extra wires per 100.....	2.2

HOSE COUPLINGS AND CLAMPS

MULCONROY HIGH PRESSURE

FEMALE

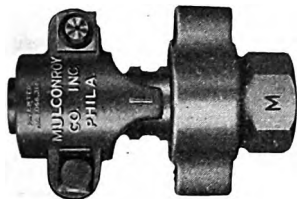


FIG. 1584

THE COUPLING THAT
NEVER BLOWS OFF

MALE

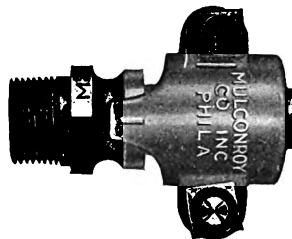


FIG. 1585

Mulconroy Couplings will not blow off under the highest pressure. They have been tested to 3000 lbs. hydraulic pressure, and we have supplied them for a working pressure of 2000 lbs. hydraulic and 200 lbs. steam.

All parts are made of extra heavy malleable iron.

Can be attached or detached in a few seconds, and will not injure tube or cover of hose.

Large output enables the manufacturers to use the most approved automatic machinery and special tools, and with

skilled workmen they produce Couplings machined perfectly, at the lowest possible cost.

Mulconroy Couplings will fit any regular hose. All threads are standard iron pipe. Separate parts can be furnished.

Mulconroy Male Couplings in the smaller sizes are particularly adapted for use on Air Hose. No matter how high the pressure, or how much pulling, twisting, vibrating or rough handling is applied to the hose, these couplings will never blow off. Cut shows $\frac{1}{2}$ " Mulconroy Male Coupling with $\frac{1}{2}$ " thread.

FEMALE						MALE			
Size Inches	Female Coupling Complete	Spud	PARTS		Clamp	Size Inches	Male Coupling Complete	PARTS	
			Nut	Stem				Male Cou- pling Stems	Male Cou- pling Clamps
$\frac{1}{2}$	\$1.20	\$0.20	\$0.25	\$0.40	\$0.40	$\frac{3}{8}$	\$0.75	\$0.60	\$0.15
$\frac{3}{4}$	2.00	.50	.70	.50	.40	$\frac{1}{2}$	1.00	.80	.20
1	2.00	.50	.70	.50	.40	$\frac{3}{4}$	1.00	.80	.20
$1\frac{1}{4}$	3.20	.60	1.30	.78	.58	1	1.00	.80	.20
$1\frac{1}{2}$	3.90	1.20	2.20	1.20	.80	$1\frac{1}{4}$	1.25	1.00	.25
2	5.00	1.40	2.20	1.40	1.20	$1\frac{1}{2}$	1.50	1.20	.30
$2\frac{1}{2}$	11.00	3.00	3.50	3.00	3.00	2	2.00	1.60	.40

When ordering extra parts, state whether for Male or Female Couplings.

State size of thread desired. $\frac{1}{2}$ inch Male Couplings are made with $\frac{3}{8}$ and $\frac{1}{2}$ inch thread. $\frac{3}{4}$ inch with $\frac{1}{2}$ and $\frac{3}{4}$ inch thread. When no size thread is given, we furnish $\frac{3}{8}$ inch thread with $\frac{1}{2}$ inch Male Couplings, and $\frac{1}{2}$ inch thread with $\frac{3}{4}$ inch. On other sizes, the size of the hose determines the thread of the couplings.

ERICKSON HOSE CLAMPS

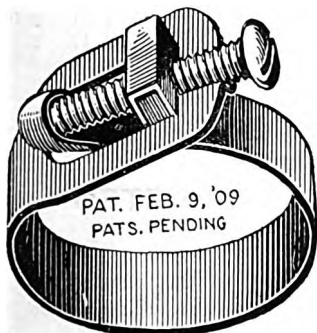


FIG. 1583

Made of galvanized soft steel, on a principle just opposite that of all the old type clamps, and the only efficient and substantial hose clamps made that can be successfully and quickly applied over the hose after the same is on the connection of the car. These clamps draw up evenly and securely, in a way possible only with this type of clamp, and will fit perfectly, connections whether round, oval and loose or tight fitting. They are supplied with long screws to give adjustment that permits each size clamp to fit several plies of hose, and clamps are but one piece to handle either on or off the hose.

PRICE LIST

Inches	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{3}{4}$	1	$1\frac{1}{4}$	$1\frac{1}{2}$	$1\frac{3}{4}$	2	$2\frac{1}{4}$	$2\frac{1}{2}$	$2\frac{3}{4}$	3
per Dozen	\$0.72	.72	.72	.72	.78	.90	.95	1.02	1.14	1.31	1.50	1.79

Sizes are inside diameter of the hose.

WATER HOSE

"REX" BRAND



FIG. 1600

Two-ply hose, designed to conduct water under moderate pressure only. Sizes above 3-inch are mainly for tank hose; 3-ply hose, of medium strength, suitable for hydrants, garden and pump uses, street sprinkling, washing decks, etc.

Four-ply hose, recommended for all purposes where a particularly strong and reliable article is required.

Five and 6-ply hose, for use where great resistance to pressure or very severe service is required.

PRICE LIST—WATER HOSE

Internal Diameter.....inches	1/2	3/4	1	1 1/4	1 1/2	1 3/4	2	2 1/4	2 1/2	2 3/4	3	3 1/2	4	5	6	7	8	9	10
Price, 2-ply.....per foot	\$.20	.25	.33	.42	.50	.58	.66	.75	.83	.92	.99	1.16	1.32	1.65	1.98	2.31	2.64	2.97	3.33
" 3 "....."	\$.25	.30	.40	.50	.60	.70	.80	.90	1.00	1.10	1.20	1.40	1.60	2.00	2.40	2.80	3.20	3.60	4.00
" 4 "....."	\$.30	.37	.50	.62	.75	.87	1.00	1.12	1.25	1.37	1.50	1.75	2.00	2.50	3.00	3.50	4.00	4.50	5.00
" 5 "....."	\$.37	.46	.62	.77	.93	1.08	1.25	1.40	1.56	1.71	1.87	2.18	2.50	3.13	3.75	4.38	5.00	5.63	6.25
" 6 "....."	\$.45	.55	.75	.93	1.12	1.30	1.50	1.68	1.87	2.05	2.25	2.62	3.00	3.75	4.50	5.25	6.00	6.75	7.50

All intermediate sizes charged at the list price of the next larger size, thus: 1 1/8-inch is charged at 1 1/4-inch price, etc. Furnished regularly in 25 and 50-foot lengths. For windings for water hose see next page.

STEAM HOSE—PLAIN

"REX" BRAND

The following table may be found useful in selecting a hose of the proper weight for the pressure in question:

Internal Diameter.	PLY	Any Pressure Under lbs.	Internal Diameter.	PLY	Any Pressure Under lbs.
1/2"	4	70	1 1/4"	8	100
1/2"	5	100	1 1/2"	4	30
3/4"	4	50	1 1/2"	5	50
3/4"	5	100	1 1/2"	6	70
1"	4	40	1 1/2"	8	100
1"	5	60	2"	4	20
1"	6	100	2"	5	30
1 1/4"	4	40	2"	6	40
1 1/4"	5	50	2"	8	80
1 1/4"	6	80			

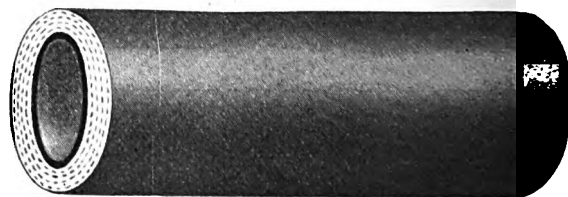


FIG. 1601

For pressures over 70 lbs. it is advisable to use cotton weave or marlin wrapping which acts as reinforcement. It is not advisable to use hose heavier than 8-ply on account of its rigidity.

PRICE LIST—PLAIN STEAM HOSE

Internal Diameter.....inches	1/2	3/4	1	1 1/4	1 1/2	1 3/4	2	2 1/4	2 1/2
Price, 3-ply.....per foot	\$.47	.57	.70	.85	1.02	1.18	1.34	1.50	1.6
" 4 "....."	\$.56	.71	.87	1.04	1.25	1.45	1.66	1.87	2.0
" 5 "....."	\$.70	.87	1.07	1.30	1.56	1.81	2.07	2.33	2.6
" 6 "....."	\$.84	1.05	1.28	1.56	1.87	2.17	2.49	2.80	3.1
" 7 "....."	\$.98	1.23	1.50	1.82	2.18	2.53	2.90	3.27	3.6
" 8 "....."	\$1.12	1.41	1.70	2.08	2.50	2.90	3.32	3.74	4.1

When ordering, state steam pressure used. For windings for steam hose see next page.

COWEN STEAM DRILL HOSE, WOVEN JACKETED

"REX" BRAND

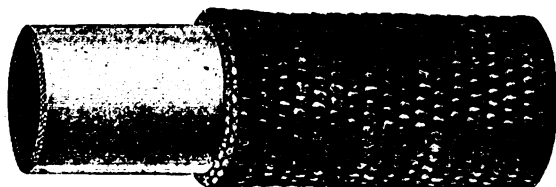


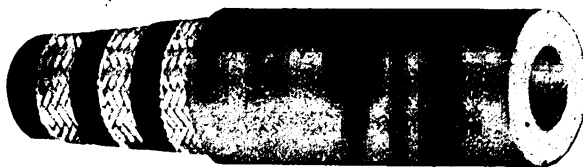
FIG. 1602

This hose is used by many of the largest mines in the country. It has repeatedly proved to be the most durable and satisfactory hose on the market.

PRICE LIST

Internal Diam. ins..	1/2	3/4	1	1 1/4	1 1/2	2
Price, per foot.....	\$.90	1.29	1.62	1.92	2.40	3.50

BRAIDED HOSE



BRAIDED STEAM HOSE LIST

FIG. 1603

BRAIDED AIR DRILL, PNEUMATIC TOOL, CHEMICAL, SAND
BLAST AND AIR BRAKE HOSE

Inch	2-ply	3-ply	4-ply	Inch	2-ply	3-ply	4-ply	5-ply
1/2	\$.56	\$.70	\$.84	3/8	\$.43	\$.51	\$.63	\$.76
5/8	.63	.79	.95	1/2	.47	.56	.70	.84
3/4	.71	.87	1.05	5/8	.52	.64	.79	.95
1	.87	1.07	1.28	3/4	.57	.71	.87	1.05
1 1/4	1.04	1.30	1.56	1	.70	.87	1.07	1.28
1 1/2	1.25	1.56	1.87	1 1/4	.85	1.04	1.30	1.56
1 3/4	1.45	1.81	2.17	1 1/2	1.02	1.25	1.56	1.87
2	1.66	2.07	2.49	1 3/4	1.18	1.45	1.81	2.17
2 1/4	1.87	2.33	2.80	2	1.34	1.66	2.07	2.49
2 1/2	2.08	2.60	3.12	2 1/4	1.50	1.87	2.33	2.80
				2 1/2	1.66	2.08	2.60	3.12

AIR DRILL HOSE

"REX" BRAND

PRICE LIST—PLAIN WITHOUT WINDING

Internal Diameter	3-ply	4-ply	5-ply	6-ply	7-ply	8-ply
1/2"	\$.47	\$.56	\$.70	\$.84	\$.98	\$1.12
3/4"	.57	.71	.87	1.05	1.23	1.41
1"	.70	.87	1.07	1.28	1.50	1.70
1 1/4"	.85	1.04	1.30	1.56	1.82	2.08
1 1/2"	1.02	1.25	1.56	1.87	2.18	2.50
1 3/4"	1.18	1.45	1.81	2.17	2.53	2.90
2"	1.34	1.66	2.07	2.49	2.90	3.32
2 1/4"	1.50	1.87	2.33	2.80	3.27	3.74
2 1/2"	1.66	2.08	2.60	3.12	3.64	4.16



FIG. 1604

For winding see list below

HOSE COVERINGS

FOR WINDING HOSE OF ALL KINDS—STEAM, WATER, AIR, ETC.—WITH MARLIN OR EITHER ROUND, FLAT OR HALF OVAL WIRE

Size Inside	Price per foot.			
	3-Ply	4-Ply	5-Ply	6-Ply
1/2"	\$.09	\$.10	\$.11	\$.12
3/4"	.11	.12	.13	.14
1"	.13	.14	.15	.16
1 1/4"	.15	.16	.17	.18
1 1/2"	.18	.19	.20	.21
1 3/4"	.20	.21	.22	.23
2"	.23	.24	.25	.26
2 1/4"	.25	.26	.27	.28
2 1/2"	.27	.28	.29	.30
3"	.32	.33	.34	.35

FOR MARLIN OR COTTON WOVEN COVERING HOSE OF ALL
KINDS—STEAM, WATER, AIR, ETC.

Size Inside	Price per foot.				
	3-Ply	4-Ply	5-Ply	6-Ply	7-Ply
1/2"	\$.17	\$.18	\$.20	\$.23	\$.24
3/4"	.20	.23	.24	.26	.27
1"	.24	.26	.27	.30	.32
1 1/4"	.27	.30	.32	.34	.36
1 1/2"	.32	.34	.36	.38	.39
1 3/4"	.36	.38	.39	.41	.44
2"	.39	.41	.44	.45	.47
2 1/4"	.44	.45	.47	.49	.53
2 1/2"	.47	.49	.53	.55	.57

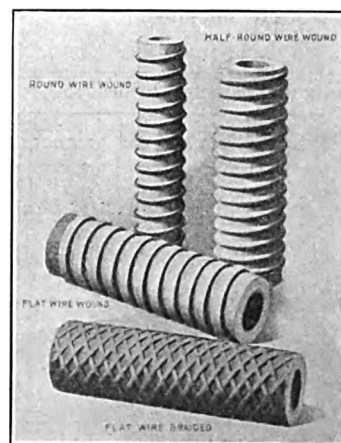


FIG. 1606



FIG. 1605

Prices and discounts for larger sizes will be furnished on application.

PLAIN AND WIRE WOUND PNEUMATIC TOOL HOSE

WRAPPED OR ROLLED DUCK TYPE



FIG. 1611

PRICE LIST

	PLAIN			WIRE WOUND	
Internal Diameter, inch....	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{3}{4}$	$\frac{3}{8}$	$\frac{1}{2}$
Ply.....	5	7	7	5	7
Price, per foot.....	\$.30	.35	.48	.36	.48

PNEUMATIC TOOL HOSE

BRAIDED OR MOULDED TYPE

PRICE LIST

Internal Diameter, inch.....	$\frac{3}{8}$	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{3}{4}$	1
Ply.....	2	3	3	3	3
Price, per foot.....	\$.43	.51	.56	.71	.87

Available in lengths up to 500 feet.

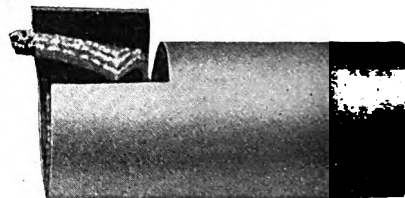


FIG. 1612

WELDING AND CUTTING HOSE

BLACK AND RED

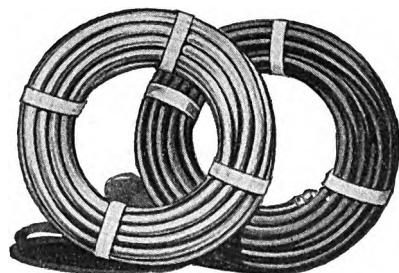


FIG. 1613

PRICE LIST

Internal Diameter, inch.....	$\frac{1}{4}$	$\frac{1}{2}$	$\frac{3}{4}$
Price, per foot for Acetylene.....	\$.24	.36	.50
Price, per foot for Oxygen.....	.30	.40	.56

GASOLINE HOSE

Made with a special lining so constructed that gasoline does not come in contact with any rubber. Its durability is furthermore increased by a flat spiral iron lining. We furnish any size to order and carry the standard size for wheel tanks ($\frac{3}{4}$ inch) in stock. The ordinary hose softens under the action of gasoline and the tube crumbles and passes into the tank often causing serious trouble. The construction of this hose absolutely obviates any trouble of this kind. Its life is practically unlimited.

PRICE LIST

Internal Diameter, inches.....	$\frac{3}{4}$	1	$1\frac{1}{4}$	$1\frac{1}{2}$	2
Price, per foot.....	\$.80	1.00	1.25	1.50	2.50

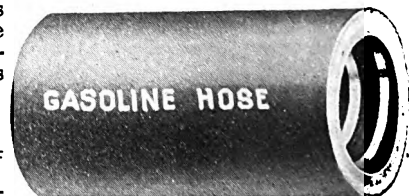


FIG. 1613

AUTOMOBILE RADIATOR HOSE

"REX" BRAND

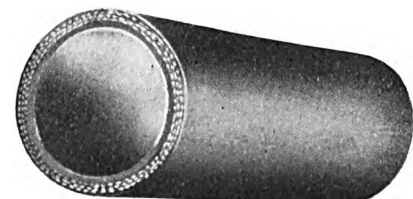


FIG. 1614

This Radiator Hose is especially made for hot water service. There are various brands of radiator hose offered at prices to suit the consumer, but it must be borne in mind that a hose suitable for cold water service is not adaptable for hot water service. The radiator hose we offer is especially for automobile use and will not harden or crack under heat given off by cylinders. The outer cover is of the same compound as the tube with heavy fabric to insure great strength. Furnish regularly in 50-foot lengths, but shorter lengths are furnished.

PRICE LIST

Internal Diameter, inches	1	$1\frac{1}{4}$	$1\frac{1}{2}$	$1\frac{3}{4}$	2	$2\frac{1}{4}$	$2\frac{1}{2}$	$2\frac{3}{4}$	3
Price, per foot.....	\$.40	.50	.60	.70	.80	.90	1.00	1.10	1.20

COTTON MILL HOSE—RUBBER LINED



FIG. 1607

This is a reliable hose in every respect—strong, durable and absolutely waterproof. It is light and pliable, reels closely, and will not sweat or leak, and is, therefore, well adapted for protection against fire in factories, public buildings, etc. Woven or knit, same list.

PRICE LIST

Size, inches.....	1¼	1½	2	2½
Price, per foot.....	\$.45	.50	.65	.80

UNLINED LINEN HOSE

Furnished in sizes 1 inch to 2½ inches. Made in any length up to 300 feet.

For general fire protection for office buildings, steamships, factories, hospitals and various institutions.

This hose consists of the finest grade of flax yarn woven on a circular loom under heavy tension.

Pure linen swells when wet and the efficiency of this hose is due to this fact, together with accuracy of construction. It, therefore, stands to reason that a mixture of cotton is detrimental to the best results.

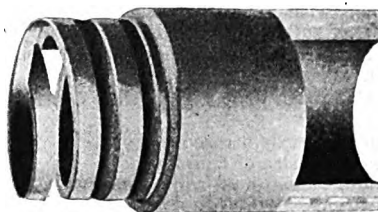
PRICE LIST

Internal Diameter, inches.....	1	1¼	1½	2	2½
Price, per foot.....	\$.50	.60	.75	1.00	1.50



FIG. 1608

SUCTION HOSE

FIG. 1609
ROUGH BOREFIG. 1610
SMOOTH BORE

Rough Bore for Flat or Round Galvanized Iron or Steel Wire.
Smooth Bore for Flat or Round Wire.

PRICE LIST PER FOOT

Internal Diam. In.	2	2¼	2½	3	3½	4	4½	5	5½	6	7	8	9	10	12	14	15	16	17	18
Rough Bore....	\$2.30	2.70	3.10	4.00	4.90	5.80	6.70	7.60	8.50	9.50	12.00	15.00	17.50	20.00	25.00	.....	.....	.....	.....	.....
Smooth Bore...	\$2.60	3.05	3.50	4.50	5.50	6.50	7.50	8.50	9.50	10.50	13.50	16.50	19.50	22.50	27.50	32.50	35.00	37.50	40.00	42.50

SUCTION HOSE NIPPLES AND BANDS

Rough and poorly fitting nipples will greatly decrease the life of any piece of suction hose and may entirely ruin it. The expense of a little care on this detail is well repaid.

Those we furnish are of good length, smooth on the surface, grooved to insure strong and tight joints, and have all edges and ends rounded off.

We furnish nipples for all sizes of suction hose.

PRICE LIST

Size, inches.....	2	2½	3	3½	4	4½	5	6	8
Price, each end.....	\$4.50	5.20	5.80	7.00	8.20	9.00	10.00	11.50	18.00

Strainers, ball and basket, brass or iron furnished and attached to hose when desired.

FLEXIBLE METALLIC GASOLINE HOSE

FOR FILLING PURPOSES



FIG. 1615

Internal Diameter, inches.....	$\frac{3}{4}$	1	$1\frac{1}{4}$	$1\frac{1}{2}$	2
Price, per foot.....	\$1.60	2.50	3.00	3.40	4.50
Coupling Extra.....	.....	.....	.....	.....	.....

FLEXIBLE METAL HOSE—ASBESTOS PACKED

BD-15 INTERLOCKED JOINTS BD-20 BRAIDED WIRE JACKET FOR STEAM, OIL, GAS, SUCTION, AIR OR CONDUIT

All Steel Hose is heavily galvanized as a protection against rust. Steel Hose of the BD Types is adapted to the handling of oils, fats, greases, etc.; also ammonia and super-heated steam. BD-20 Steel Hose can be used for carrying saturated steam, but, except in special cases, is not recommended for this work.

Bronze Hose in the BD Types is made primarily for conveying saturated steam. Neither BD-15 nor BD-20 Bronze Hose is affected by moisture or intense heat, and both are suitable for a wide variety of services.

BD-20 Hose is similar to BD-15 with the exception that it is strengthened with a braided wire for covering and spiral armor wire. It is suitable for higher internal pressures than the unbraided hose, and is recommended in cases where rough handling is unavoidable.

IMPORTANT: In ordering Flexible Metal Hose, always specify:

- Length, size and style wanted.
- Style, thread and size of couplings.
- Pressure under which hose will be used.
- Nature of service.



FIG. 1616
BD-15



FIG. 1617
BD-20

PRICE PER FOOT

Internal Diameter, inches.....	$\frac{1}{8}$	$\frac{1}{4}$	$\frac{5}{16}$	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{3}{4}$	1	$1\frac{1}{4}$	$1\frac{1}{2}$	2	$2\frac{1}{2}$	3	4	6
BD-15 Steel.....	\$0.30	.35	.40	.45	.55	.85	.95	1.30	1.70	2.25	3.20	3.55	4.50	8.00
BD-15 Bronze.....	\$0.35	.45	.75	1.25	1.50	2.05	2.65	3.20	4.25	5.65	6.75	7.90	10.15	...
BD-20 Steel, steel braided.....	\$0.20	.25	.33	.45	.55	.85	1.05	1.35	1.80	2.30	2.90	...	...	...
BD-20 Bronze, steel braided.....	\$0.23	.31	.45	.75	1.00	1.50	1.90	2.60	3.25	4.50	5.30	...	...	...
BD-20 Bronze, bronze braided.....	\$0.27	.35	.50	.85	1.20	1.75	2.30	3.15	3.90	5.15	6.30	...	...	...

COUPLINGS

SOLDERED COUPLINGS FOR OIL, AIR, GAS AND WATER HOSE. PACKED COUPLINGS, FOR STEAM HOSE

PRICE PER SET

Size I. P. T.....	$\frac{1}{4}$	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{3}{4}$	1	$1\frac{1}{4}$	$1\frac{1}{2}$	2	$2\frac{1}{2}$	3	4
Soldered.....	\$0.60	1.00	1.50	2.00	2.50	3.00	4.00	6.00	8.00	10.00	12.00
Packed.....	\$2.00	2.50	3.00	4.00	5.00	6.00	7.00	9.00	12.00	15.00	25.00

Price on special and large sizes of Couplings or Flanges—on application.

All Couplings, unless otherwise specified, have Standard Iron Pipe Threads, corresponding to the internal diameter of the Hose to which they are attached. Soldered Couplings are sweated on and should never be used on Steam Hose or in any service where there is sufficient heat to soften solder. Couplings for Steam Hose are packed on with asbestos and red lead and will stand high pressure and high heat. Packed Couplings for $\frac{1}{2}$, $\frac{3}{4}$, 1 and $1\frac{1}{4}$ -inch Hose and Soldered Couplings for $\frac{3}{8}$, $\frac{1}{2}$ and $\frac{3}{4}$ inch Hose are always furnished with reinforced ends unless otherwise ordered.

SHEET RUBBER PACKING—PLAIN**RAINBOW AND REX BRANDS**

Will not harden under any degree of heat, or blow out under the highest pressure and will make an Air, Steam, Hot or Cold Water joint equally well. It is not affected by Oils, Ammonia, Liquors, Steam, Heat or Alkalies.

PRICE LIST

Thickness, Inches.....	$\frac{1}{32}$	$\frac{1}{16}$	$\frac{3}{32}$	$\frac{1}{8}$	$\frac{5}{16}$	$\frac{1}{4}$
Wt. Sq. Yd., lbs.....	3 $\frac{1}{4}$	6 $\frac{1}{2}$	10	12 $\frac{1}{2}$	19 $\frac{1}{2}$	25
Rainbow, Price per lb.....	\$1.00	1.00	1.00	1.00	1.00	1.00
Rex, Price per lb.....	\$1.00	1.00	1.00	1.00	1.00	1.00

In rolls 36 inches wide.

FIG. 1618

SHEET RUBBER PACKING—WIRE INSERTION**RAINBOW AND REX BRANDS****FOR HIGH PRESSURE STEAM**

Adapted for high pressure steam and especially recommended for Marine work. Insertion is brass wire. 36 inches wide.

PRICE LIST

Thickness, Inches.....	$\frac{1}{32}$	$\frac{1}{16}$	$\frac{3}{32}$	$\frac{1}{8}$	$\frac{5}{16}$	$\frac{1}{4}$
Weight per Square Yard, pounds....	3 $\frac{1}{4}$	6 $\frac{1}{2}$	9	12	17	24
Rainbow, Price per pound.....	\$1.50	1.50	1.50	1.50	1.50	1.50
Rex, Price per pound.....	\$1.50	1.50	1.50	1.50	1.50	1.50

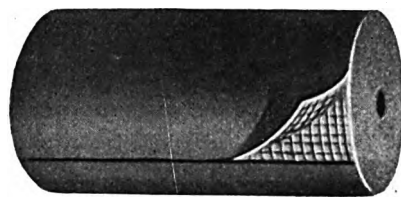


FIG. 1619

SHEET RUBBER PACKING—CLOTH INSERTION**"REX" BRAND****FOR COLD WATER AND LOW PRESSURES**

A popular style of packing for cold water and low pressures. Rex Brand combines smoothness of finish, strength of cloth insertion and pliability.

PRICE LIST

Thickness, Inches.....	$\frac{1}{32}$	$\frac{1}{16}$	$\frac{3}{32}$	$\frac{1}{8}$	$\frac{5}{16}$	$\frac{1}{4}$
Weight Square Yard, pounds.....	2 $\frac{1}{2}$	5 $\frac{1}{2}$	7 $\frac{1}{2}$	11	16	22
Price, per pound.....	\$0.50	.50	.50	.50	.50	.50

One-Ply cloth to every $\frac{1}{16}$ -inch thickness.

In rolls three feet wide.

FIG. 1620

**ADPASCO GASKET PAPER
TREATED**

An innovation in paper packing. A durable especially made paper sheet with a waterproof compound between the layers. Adpasco is an ideal sheet packing for automobiles, tractors, trucks, and for stationary gas engines. Can be used with success any place except in direct contact with heat. (Use Tenax for heat.) Adpasco is waterproof, economical and easy to handle.

Sheets 36 x 40 inches, $\frac{1}{16}$ inch thick, per sheet..... \$0.75

Weight $\frac{3}{4}$ lb. per sheet.



FIG. 5011

SHEET ASBESTOS PACKING—RED AND BLACK**MOTORLENE BRAND****FOR GAS AND GASOLINE ENGINES—STATIONARY MARINE OR MOTOR VEHICLE SERVICE**

FIG. 1622

Motorlene Packing is made from specially prepared Asbestos yarn, with fine brass wire inserted, woven into a very dense firm cloth, possessing great strength. It is thoroughly saturated with a special Heat-resisting Composition to resist the action of the water from the cooling jacket. It is pliable, compressible and easily cut and unusually thin, being only about $\frac{1}{16}$ -inch thick. Supplied in sheets 40 inches square or rolls 40 inches wide and weighs 4 pounds per square yard. Graphited on one side and ready for immediate application.

Price per Pound..... \$1.50

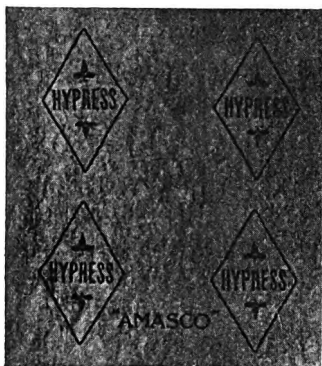


FIG. 1623

SHEET ASBESTOS PACKING

HYPRESS BRAND

CANNOT BE AFFECTED BY HEAT OR OIL

This packing is a composition of asbestos and fibre. Cannot be affected by heat or oil. In sheets about 4 feet square, $\frac{1}{8}$, $\frac{1}{16}$, $\frac{1}{32}$ -inch thick; weight, about 5 pounds to the sheet $\frac{1}{8}$ inch thick; other sizes in proportion. Prevents any leakage about superheated steam joints.

Price, per pound..... \$1.50

SEIGELITE SHEET PACKING

FOR GASOLINE, BENZINE, GREASE, HOT AND COLD WATER CONNECTIONS

Seigelite Sheet Packing is a fibrous sheet packing treated to withstand the actions of gasoline, benzine, grease, hot and cold water and air. Not adapted for steam use.

It is much more desirable than Cloth Insertion sheet for service because of its great tensile strength and low cost. Seigelite contains no rubber or rubber substitutes and when soaked in water or oil it becomes even tougher and more pliable than when dry. Sold by the square yard.

PRICE LIST

Thickness, Inches	$\frac{1}{8}$	$\frac{1}{16}$	$\frac{1}{32}$	$\frac{1}{64}$
Width, Inches.....	46 to 48	46 to 48	48 x 36	48 x 36
Length, Yard Rolls.....	25 or 50	25 or 50	sheets only	sheets only
List Price per square yard...	\$1.65	\$2.35	\$5.15	\$10.00



FIG. 1624

NUMBER 60 SERVICE SHEET PACKING

(FORMERLY KNOWN AS PERMANITE)

CAN BE USED IN MINIMUM THICKNESSES

Service Packing is made of asbestos fibre felted and bonded together with heat-resistant compounds. It is not a laminated packing, but a homogeneous sheet, resilient, pliable and possessing great tensile strength, and as it does not deteriorate with age, it retains its life whether in the pipe flange or in stock.

With Service Sheet No. 60 you do not have to spend time tightening up loose, leaking joints or inspecting and discarding deteriorated packing. Can be used at all temperatures and pressures, and is especially adapted to gas engines, steam cylinders, steam chests, high pressure steam lines, air and ammonia, and most chemical solutions.

As they will not char, blow out, squeeze out nor stick to the flanges, Service Gaskets can be removed and replaced any number of times without injury. Furnished in sheets 54-inches by 63-inches in the following thicknesses and approximate weights per sheet:

PRICE LIST

Size, Inch	$\frac{1}{8}$	$\frac{1}{16}$	$\frac{1}{32}$	$\frac{1}{64}$	$\frac{1}{128}$
Weight per Square Yard.....	1 lb. 3 oz.	2 lbs. 10 oz.	5 lbs. 4 oz.	8 lbs. 2 oz.	11 lbs.
Full Sheets, per lb.....	\$2.65	\$1.75	\$1.75	\$2.00	\$2.00
Half Sheets, per lb.....	3.00	1.85	1.85	2.15	2.15
Smaller Quantities, per lb.....	3.40	2.10	2.10	2.30	2.30

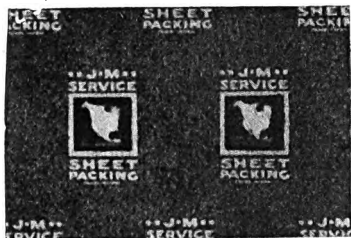


FIG. 1625

TENAX SHEET PACKING

COMPRESSED ASBESTOS

Tenax is a very tough compressed asbestos fibre sheet. It will stand a temperature of 1600 degrees F. and a pressure of 6000 pounds. Will, without ever giving out or thinning down, stand up under a gas engine exhaust, cylinder explosions, acid alkali, ammonia, oils and superheat steam. Will not squeeze out of the joints, never requires any following up, and because it is lighter in weight it is cheaper per square foot of covering surface than any rubber packing. Made in blue, red and black.

SHEETS 50 X 50 INCHES

Thickness of sheet, inch.....	$\frac{1}{8}$	$\frac{1}{16}$	$\frac{1}{32}$	$\frac{1}{64}$	$\frac{1}{128}$
Approximate weight per sheet, lbs.....	2	4½	9½	12	18
Price per sheet.....	\$1.75	1.50	1.50	1.50	1.50

*Black color only.



FIG. 5012

HYDRAULIC SQUARE PACKING**"REX" BRAND****FOR PUMP PISTONS, OTHER HIGH PRESSURES, ETC.**

This is a very superior grade, made of fine pure, white rubber. It is designed for pump pistons and inside packed plunger pumps, and all other high pressures, hot water, etc.

Made in sizes: $\frac{1}{4}$, $\frac{1}{8}$, $\frac{3}{8}$, $\frac{1}{2}$, $\frac{5}{8}$, $\frac{3}{4}$, $\frac{7}{8}$, and 1 inch.

Price, per pound \$1.00

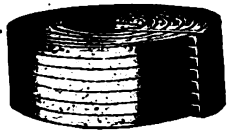


FIG. 1627

SQUARE FLAX PACKING**"REX" BRAND—X BRAND—AND PLUMBAGOED
FOR MILLS, WATER SUPPLY STATIONS, STEAMSHIPS**

The Rex Square Flax Packing is especially designed to meet the requirement of mills, water supply stations, steamships, etc. It is made of long fibre, evenly braided with rounded corners. It is fully guaranteed.

REX BRAND Sizes $\frac{1}{4}$ to 2-inches.	Price per lb.....	\$1.00
X BRAND Sizes $\frac{1}{4}$ to 2-inches.	Price per lb.....	.50
PLUMBAGOED Sizes $\frac{1}{4}$ to 1 $\frac{1}{2}$ -inches.	Price per lb.....	1.00

FOR AUTOMOBILE PUMPS

Sizes $\frac{1}{8}$ -inch and $\frac{1}{4}$ -inch. In one Pound Spools.

Price Each..... \$1.50

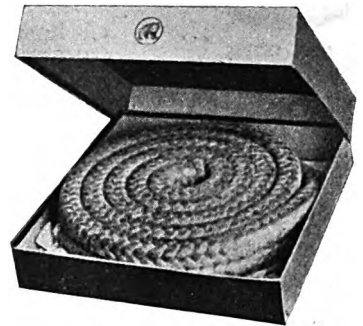


FIG. 1628

SPIRAL PISTON PACKING**"REX" BRAND****FOR STEAM, HOT WATER, AMMONIA OR OIL**

The "Rex" Brand Piston Packing is made to stand high pressure and will not harden in stuffing box.

Made in sizes $\frac{1}{4}$ -inch to 2 inches. Pressure to 100 lbs.

Price, per pound..... \$1.50



FIG. 1629

ROUND RED CORE SPIRAL PACKING**"REX" BRAND****FOR HIGH PRESSURE STEAM OR WATER**

The "Rex" Brand is manufactured of the best grade rubber and cotton duck. It is especially adapted to high pressure either steam or water. Will not harden under heat. Put up in 5 and 10 pound boxes.

Price per pound..... \$1.50

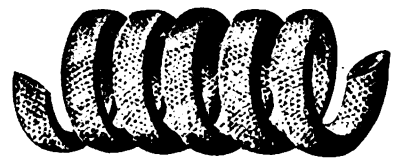


FIG. 1630

MOGUL WICK PACKING**FOR VALVE STEMS AND PISTON RODS**

Fits any stuffing box. Will not get hard or gum the rod. Made to stand high pressure and temperature. Braided or twisted from pure asbestos yarn. Every strand saturated with a special lubricant.

PRICE LIST

Size, inch.....	$\frac{1}{8}$	$\frac{1}{4}$	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{3}{4}$
1 lb. Spools, price each.....	\$2.00	2.00	2.00	2.00	2.00

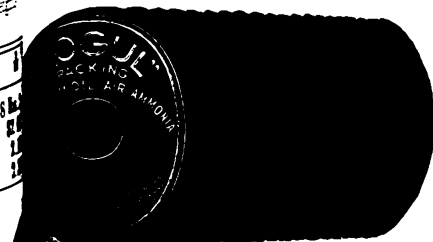


FIG. 1631

BESTALLIC WICK PACKING**HIGH PRESSURE****NEVER GETS HARD**

For valve stem stuffing boxes, circulating water pumps, etc. Each strand made of hard twisted asbestos of long fibre. Lubricated with special compounds and graphited. Sizes, $\frac{1}{8}$, $\frac{1}{4}$, $\frac{3}{8}$, $\frac{1}{2}$ and $\frac{3}{4}$ inch. Put up on $\frac{1}{4}$, $\frac{1}{2}$ and 1 lb. spools.

lb. spools, per lb.....	\$2.50
lb. spools, per lb.....	2.00
lb. spools, per lb.....	2.00

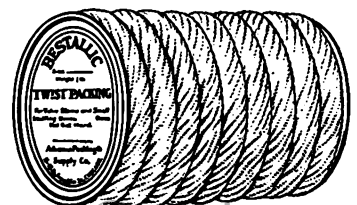


FIG. 5013

CENTRIFUGAL PUMP PACKING**"REX" BRAND**

This is a lubricated packing made with a hemp center and a braided cotton cover. Made especially for centrifugal pumps. Sizes $\frac{1}{4}$ to $\frac{1}{8}$ -inch.

Price, per pound..... \$1.50



FIG. 1632 1/2

ASBESTOS SPARK PLUG PACKING

Approximately $\frac{1}{16}$ th inch diameter. Wire Inserted. Put up in one ounce spools.

Price, per spool..... \$0.50

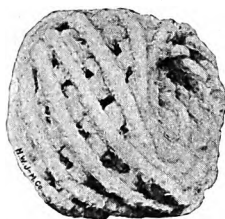


FIG. 1634

ASBESTOS WICK**FOR GENERAL POWER PLANT PURPOSES**

This material is composed of Asbestos Fibre spun into a strand (which can be separated) and made into the form of a soft wick. Furnished in $\frac{1}{2}$ lb. and 1 lb. balls.

Price, per lb..... \$1.30

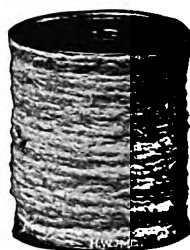


FIG. 1633

COTTON CANDLE WICKING

Put up in 2 ounce balls, Price each..... \$0.20



FIG. 1635

GAUGE GLASS WASHERS**"REX" BRAND**

Extra Pure Red or Black Rubber. Round, Square or Plain.

PRICE LIST

Size, inches.....	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{5}{8}$	$\frac{3}{4}$	$\frac{7}{8}$	1
Price, dozen.....	\$0.10	.15	.20	.25	.30	.35



FIG. 1636

**BOILER GASKETS**

RUBBER AND ASBESTOS
"REX" BRAND

When ordering give inside diameter, width of flange and thickness required.

Asbestos, Price per lb..... \$2.50
Rubber, Price per lb..... 1.00

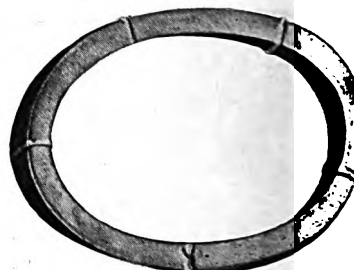


FIG. 1637

WASHER CUTTERS

No. 2. Cuts washers up to 12-inch diameter.

Price each \$2.00
Extra Blades, per dozen..... 2.00

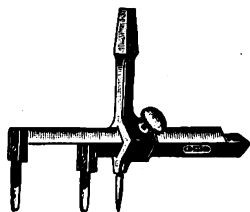


FIG. 1626

"VICTOR" COPPER-ASBESTOS SPECIAL THREADED GASKETS

FOR SPARK PLUGS

FIG. 1640
CLOSED TYPEFIG. 1641
FRENCH TYPE

SIZES AND PRICES

No.	Inside Diam. inches	Outside Diam. inches	Type	List Price 100	No.	Inside Diam. inches	Outside Diam. inches	Type	List Price 100
1138A					1161	$\frac{1}{8}$	$\frac{5}{8}$	Closed	\$.70
A. L. A. M.					1162	$\frac{1}{8}$	$\frac{1}{2}$	Closed	.70
1138	$\frac{1}{8}$	$1\frac{1}{8}$	Closed	.88	1163	$\frac{1}{8}$	$\frac{1}{2}$	Closed	.72
$\frac{1}{2}$ plug	$\frac{1}{2}$	$1\frac{1}{2}$	Closed	.88	1164	$\frac{1}{8}$	$\frac{1}{2}$	Closed	.76
1137	$\frac{1}{8}$	$\frac{3}{4}$	Closed	.88	1165	$\frac{1}{8}$	$\frac{1}{2}$	Closed	.80
Metric	$\frac{1}{8}$	$\frac{3}{4}$	Closed	.88	1166	$\frac{1}{8}$	1	Closed	.80
1138	$\frac{5}{8}$	$1\frac{1}{8}$	Closed	.88	1167	$\frac{1}{2}$	$\frac{1}{2}$	Closed	.76
1139	$\frac{5}{8}$	$1\frac{1}{8}$	French	.84	1168	$\frac{1}{2}$	$\frac{1}{2}$	Copper	
1140	$\frac{1}{2}$	$\frac{3}{4}$	Closed	.80				Washer	.42
1141	$\frac{1}{2}$	$\frac{3}{4}$	French	.84	1169	$\frac{1}{8}$	$\frac{5}{8}$	French	.80
1142	$\frac{1}{2}$	$\frac{3}{4}$	French	.92	1170	Metric Size	...	Flange	.70
1143	$\frac{1}{2}$	$\frac{3}{4}$	French	.80					
1144	$\frac{1}{2}$	$\frac{3}{4}$	French	.80	1171	A. L. A. M. Size	...	Flange	.80
1145	$\frac{1}{2}$	$\frac{3}{4}$	French	.76					
1146	$\frac{1}{2}$	$\frac{3}{4}$	Closed	.76	1172	$\frac{1}{8}$	$\frac{1}{2}$	Closed	.74
1147	$\frac{1}{2}$	$\frac{3}{4}$	French	.87	1174	$1\frac{1}{2}$	$1\frac{1}{2}$	Closed	1.00
1148	$\frac{1}{2}$	$\frac{3}{4}$	French	.80	1175	$\frac{1}{8}$	$\frac{5}{8}$	Flange	.50
1149	$\frac{1}{2}$	$\frac{3}{4}$	French	.80	1176	$\frac{1}{2}$	$\frac{3}{4}$	Copper	
1150	$\frac{1}{8}$	$\frac{5}{8}$	French	.73				Washer	.44
1151	$\frac{1}{8}$	$\frac{5}{8}$	French	.73	1177	$\frac{1}{8}$	$\frac{1}{2}$	Asbestos	
1152	$\frac{1}{8}$	$\frac{5}{8}$	French	.73				Washer	.36
1153	$\frac{1}{8}$	$\frac{5}{8}$	French	.73	1178	$\frac{1}{8}$	$\frac{3}{8}$	Asbestos	
1154	$\frac{1}{8}$	$\frac{5}{8}$	Closed	.76				Washer	.38
1155	$\frac{1}{8}$	$\frac{5}{8}$	French	.67	1179	$\frac{1}{8}$	$\frac{3}{4}$	Closed	.76
1156	$\frac{1}{8}$	$\frac{5}{8}$	Closed	.69	1180	$\frac{1}{8}$	...	Flange	.90
1157	$\frac{1}{8}$	$\frac{5}{8}$	Closed	.73	1181	$\frac{1}{8}$	$\frac{1}{2}$	French	.84
1158	$\frac{1}{8}$	$\frac{5}{8}$	Closed	.76	1182	$\frac{1}{8}$	$\frac{1}{2}$	Closed	.88
1159	$\frac{1}{8}$	$\frac{1}{2}$	French	.76	1183	$\frac{1}{8}$	$\frac{5}{8}$	French	.88
1160	$\frac{1}{8}$	$\frac{1}{2}$	French	.67	1184	$\frac{1}{8}$	$\frac{1}{2}$	Closed	1.00

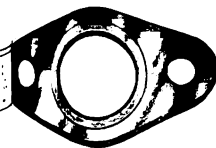


FIG 1642

"VICTOR" COPPER-BRASS-ASBESTOS GASKETS

FOR INTAKE AND EXHAUST PIPES, MANIFOLDS, CARBURETORS, ETC.

STANDARD FLANGE TYPE

SIZES AND PRICES

Trade No.	Size Centre Hole Inches	Size Bolt Holes Inches	Distance from center to center of Bolt Holes Inches	Size over all Inches	List Price per 100	Trade No.	Size Centre Hole Inches	Size Bolt Holes Inches	Distance from center to center of Bolt Holes Inches	Size over all Inches	List Price per 100
0	$\frac{7}{8}$	$\frac{1}{4}$	$1\frac{1}{8}$	$1\frac{1}{8} \times 2\frac{1}{8}$	\$3.00	17	$1\frac{1}{8}$	$\frac{1}{2}$	$3\frac{1}{8}$	$2\frac{1}{2} \times 3\frac{7}{8}$	\$ 6.00
1	$\frac{1}{2}$	$\frac{1}{8}$	$1\frac{1}{8}$	$1\frac{1}{8} \times 2\frac{1}{2}$	3.00	18	2	$\frac{1}{2}$	$3\frac{1}{2}$	$2\frac{1}{2} \times 4\frac{1}{2}$	6.40
2	$\frac{1}{2}$	$\frac{1}{8}$	$2\frac{1}{8}$	$1\frac{1}{8} \times 2\frac{1}{2}$	3.40	19	$2\frac{1}{8}$	$\frac{1}{2}$	$3\frac{1}{2}$	$2\frac{1}{8} \times 4\frac{1}{2}$	6.80
3	$1\frac{1}{8}$	$\frac{1}{8}$	2	$1\frac{1}{8} \times 2\frac{5}{8}$	3.60	20	$2\frac{1}{8}$	$\frac{1}{2}$	$3\frac{1}{2}$	$2\frac{1}{8} \times 4\frac{5}{8}$	6.80
4	$1\frac{1}{8}$	$\frac{1}{8}$	$2\frac{1}{8}$	$1\frac{1}{8} \times 3$	3.60	21	$2\frac{1}{8}$	$\frac{1}{2}$	$3\frac{1}{2}$	$3\frac{1}{8} \times 4\frac{5}{8}$	7.20
5	$1\frac{1}{8}$	$\frac{1}{8}$	$1\frac{1}{8}$	$1\frac{1}{8} \times 2\frac{5}{8}$	3.80	22	$2\frac{1}{8}$	$\frac{1}{2}$	$3\frac{1}{2}$	$3\frac{1}{8} \times 4\frac{1}{2}$	7.60
6	$1\frac{1}{8}$	$\frac{1}{8}$	$2\frac{1}{8}$	$1\frac{1}{8} \times 2\frac{1}{2}$	3.80	23	$2\frac{1}{8}$	$\frac{1}{2}$	4	3 x 5	7.80
7	$1\frac{1}{8}$	$\frac{1}{8}$	$2\frac{1}{8}$	$1\frac{1}{8} \times 3\frac{1}{8}$	4.00	24	$2\frac{1}{8}$	$\frac{1}{2}$	$3\frac{1}{8}$	$3\frac{1}{8} \times 5$	8.00
8	$1\frac{1}{8}$	$\frac{1}{8}$	$2\frac{1}{8}$	$2\frac{1}{8} \times 3\frac{1}{2}$	4.20	25	$2\frac{1}{8}$	$\frac{1}{2}$	$3\frac{1}{8}$	$3\frac{1}{8} \times 4\frac{5}{8}$	8.40
9	$1\frac{1}{8}$	$\frac{1}{8}$	$2\frac{1}{8}$	$2\frac{1}{8} \times 2$	4.20	26	$2\frac{1}{8}$	$\frac{1}{2}$	4	$3\frac{1}{8} \times 5\frac{1}{8}$	8.60
10	$1\frac{1}{2}$	$\frac{1}{8}$	$2\frac{1}{8}$	2 x $3\frac{1}{4}$	4.40	27	$2\frac{1}{8}$	$\frac{1}{2}$	4	$3\frac{1}{2} \times 5\frac{1}{8}$	9.20
11	$1\frac{1}{2}$	$\frac{1}{8}$	$3\frac{1}{8}$	$2\frac{1}{8} \times 3\frac{7}{8}$	4.80	28	3	$\frac{1}{2}$	$4\frac{3}{8}$	4 x $5\frac{1}{8}$	10.40
12	$1\frac{1}{2}$	$\frac{1}{8}$	$2\frac{1}{8}$	$2\frac{1}{8} \times 3\frac{3}{4}$	4.80	29	$3\frac{1}{4}$	$\frac{1}{2}$	$4\frac{3}{4}$	$4\frac{3}{8} \times 6\frac{1}{2}$	12.80
13	$1\frac{1}{2}$	$\frac{1}{8}$	$2\frac{1}{8}$	$2\frac{1}{8} \times 3\frac{3}{4}$	5.20	30	$3\frac{1}{2}$	$\frac{1}{2}$	$6\frac{1}{2}$	$5\frac{5}{8} \times 8\frac{1}{2}$	13.20
14	$1\frac{1}{2}$	$\frac{1}{8}$	3	$2\frac{1}{8} \times 3\frac{7}{8}$	5.40	31	$3\frac{3}{4}$	$\frac{1}{2}$	$6\frac{1}{2}$	$5\frac{5}{8} \times 8\frac{1}{2}$	14.20
15	$1\frac{1}{2}$	$\frac{1}{8}$	$3\frac{1}{8}$	$2\frac{1}{8} \times 4\frac{1}{4}$	5.60	32	4	$\frac{1}{2}$	$6\frac{1}{2}$	$5\frac{5}{8} \times 8\frac{1}{2}$	15.40
16	$1\frac{1}{2}$	$\frac{1}{8}$	$3\frac{1}{8}$	$2\frac{1}{2} \times 4$	5.60						

"VICTOR" COPPER-ASBESTOS ROUND GASKETS

STANDARD CLOSED TYPE



FIG. 1638
CROSS SECTION VIEW

STANDARD FRENCH TYPE



FIG. 1639
CROSS SECTION VIEW

SIZES AND PRICES

No.	Inside Diam. Inches	Outside Diam. Inches	List Price Per 100	No.	Inside Diam. Inches	Outside Diam. Inches	List Price Per 100	No.	Inside Diam. Inches	App. width of flange inch	List Price Per 100	No.	Inside Diam. Inches	App. width of flange inch	List Price Per 100
101	1	1 1/4	\$1.00	127	2 3/8	2 3/4	\$2.20	201	7/8	1/8	\$1.40	227	2 1/2	1/8	\$3.36
102	1 1/8	1 3/4	1.16	128	2 3/8	2 3/4	2.28	202	1 1/8	1/8	1.40	228	2 3/8	1/8	3.72
103	1 1/4	1 3/4	1.24	129	2 3/8	2 3/4	2.28	203	1	1/8	1.48	229	2 3/8	1/8	3.72
104	1 1/4	1 3/4	1.28	130	2 1/4	2 1/2	2.28	204	1 1/4	1/8	1.52	230	2 1/2	1/8	3.80
105	1 1/4	1 3/4	1.40	131	2 1/4	2 1/2	2.28	205	1 1/8	1/8	1.64	231	2 3/4	1/8	3.80
106	1 1/4	1 3/4	1.64	132	2 3/8	2 3/4	2.36	206	1 1/4	1/8	1.64	232	2 1/2	1/8	3.92
107	1 1/4	1 3/4	1.64	133	2 3/8	2 3/4	2.36	207	1 1/4	1/8	1.64	233	2 3/8	1/8	4.08
108	1 3/8	1 3/4	1.64	134	2 3/8	2 3/4	2.36	208	1 1/4	1/8	1.76	234	2 1/2	1/8	4.08
109	1 1/2	1 3/4	1.72	135	2 3/8	2 3/4	2.36	209	1 3/8	1/8	2.00	235	3	1/8	4.08
110	1 1/4	1 3/4	1.72	136	2 1/2	2 3/4	2.52	210	1 1/4	1/8	2.24	236	3 1/8	1/8	4.20
111	1 1/2	1 3/4	1.72	137	2 3/8	2 3/4	2.56	211	1 1/2	1/8	2.24	237	3 3/8	1/8	4.20
112	1 1/4	1 3/4	1.72	138	2 3/8	2 3/4	2.60	212	1 1/4	1/8	2.44	238	3 1/4	1/8	4.24
113	1 3/8	1 3/4	1.72	139	2 3/4	3	2.76	213	1 3/8	1/8	2.44	239	3 3/4	1/8	4.40
114	1 1/4	1 3/4	1.76	140	2 1/2	3 1/8	2.88	214	1 1/4	1/8	2.56	240	3 3/8	1/8	4.60
115	1 3/4	2	1.76	141	2 3/4	3 1/8	3.00	215	1 3/4	1/8	2.56	241	3 3/8	1/8	4.64
116	1 1/4	1 3/4	1.80	142	2 3/8	3 3/8	3.00	216	1 1/4	1/8	2.60	242	3 3/8	1/8	4.64
117	1 1/4	2 1/8	1.88	143	2 1/2	3 1/4	3.00	217	1 3/8	1/8	2.60	243	3 1/2	1/8	4.80
118	1 3/8	2 1/8	1.88	144	3	3 1/4	3.04	218	1 1/4	1/8	2.64	244	3 1/2	1/8	4.92
119	1 3/8	2 1/8	1.88	145	3 1/8	3 1/4	3.04	219	2	1/8	2.64	245	3 3/8	1/8	5.40
120	1 1/4	2 1/8	1.96	146	3 1/8	3 3/8	3.32	220	2 1/8	3/8	2.64	246	3 1/4	1/8	5.60
121	1 1/4	2 1/8	1.96	147	3 3/8	3 3/8	3.68	221	2 1/8	3/8	2.72	247	3 3/4	1/8	5.68
122	2	2 3/4	1.96	148	3 1/4	3 1/2	3.72	222	2 1/8	3/8	3.00	248	3 1/8	1/8	5.68
123	2 1/8	2 3/4	1.96	149	3 3/8	3 3/8	3.80	223	2 1/4	3/8	3.16	249	3 3/8	1/8	5.80
124	2 1/8	2 3/4	2.00	150	3 3/8	3 3/4	3.88	224	2 1/8	3/8	3.16	250	3 1/8	1/8	5.88
125	2 1/8	2 3/4	2.00	151	3 1/8	3 1/4	3.96	225	2 3/8	3/8	3.20	251	4	1/8	6.20
126	2 3/8	2 3/4	2.20	152	3 1/2	3 3/4	4.72	226	2 1/8	3/8	3.20	252	4 1/4	1/8	7.30

WILMINGTON VULCANIZED ROUND FIBRE RODS

PRICE LIST

Diam. ins. Ft. per lb.	3/32	1/16	1/8	1/4	3/8	1/2	5/8	3/4	7/8	1	1 1/8	1 1/4	1 1/2	1 3/4	2
Price, per ft.															
9 or less	\$.30	\$.30	\$.30	\$.32	\$.36	\$.40	\$.48	\$.60	\$.72	\$.84	\$1.00	\$1.20	\$1.44	\$1.60	\$1.80
10 to 24	.24	.24	.24	.28	.30	.34	.42	.50	.60	.72	.84	1.00	1.16	1.32	1.48
25 to 49	.20	.20	.20	.22	.24	.28	.36	.40	.50	.60	.70	.80	.90	1.00	1.10
50 to 99	.16	.16	.16	.18	.20	.24	.32	.36	.40	.50	.60	.66	.72	.80	.88
100 to 499	.14	.14	.14	.16	.18	.22	.28	.32	.36	.42	.50	.60	...	...	...
500 to 999	.12	.12	.12	.14	.16	.20	.24	.30	...	...	...	...	...	...	...
Diam. inches Ft. per lb.	7/8	1	1 1/8	1 1/4	1 3/8	1 1/2	1 5/8	1 3/4	1 7/8	2	2 1/8	2 1/4	2 3/4	3	3 1/2
Price, per ft.															
9 or less	\$1.68	\$2.00	\$2.40	\$3.00	\$4.00	\$5.00	\$6.00	\$7.00	\$10.00	\$16.00	\$24.00	\$36.00	\$50.00	\$60.00	\$70.00
10 to 24	1.32	1.50	1.80	2.00	3.00	4.00	5.50	...	...	...	...	...	...	...	...
25 to 49	1.00	1.20	1.40	1.60	2.40	3.50	5.00	...	...	...	...	...	...	...	...
50 to 99	.84	1.00	1.20	...	...	...	...	...	...	...	...	...	...	...	...
100 to 499	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
500 to 999	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...

Intermediate sizes at next higher price except: Sizes not more than .015" over size take the price of the standard size.
 For cutting rods 1/8-inch and thinner add 10% to list.
 For cutting rods 1/2-inch and thicker add 20% to list.
 The feet per pound will vary with the grade of the fibre and are not guaranteed.

WILMINGTON VULCANIZED FIBRE SHEETS

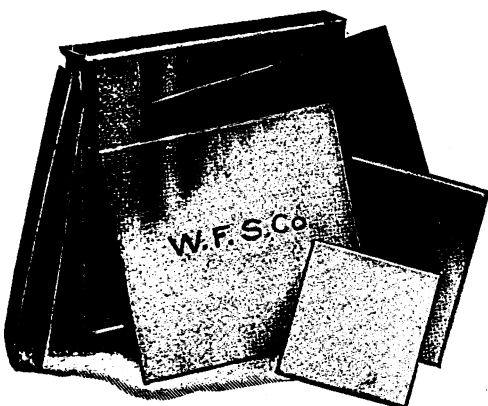


FIG. 1643

Vulcanized Fibre, also known as Hard Fibre, Horn Fibre and countless other names, is a hard, bonelike substance closely resembling horn. Vulcanized Fibre is an excellent electrical insulator.

Chemical Properties—It is absolutely unaffected by any of the ordinary solvents; it is not injured by immersion in Alcohol, Ether, Ammonia, Naphtha, Turpentine or similar products; nor by any of the animal or other oils.

Mechanical Properties—The tensile strength varies from ten thousand to twenty thousand pounds per square inch, the maximum being reached in stock from three thirty-seconds to one-half inch in thickness. The resistance to compression varies from forty thousand to sixty thousand pounds per square inch.

Physical Properties—Vulcanized Fibre will not melt under any circumstances, nor is it readily inflammable, but at a very high temperature it chars and becomes brittle. Active combustion begins at a temperature of six hundred fifty degrees Fahrenheit.

Forms—This material is made in Sheets, Rods and Tubes, and it is only possible to produce such special shapes as can be machined from these primal forms. It can not be molded. It will admit of a fine finish, is an excellent insulator, and improves with age; it may be sawed, punched, stamped, embossed, turned, planed, bent and tapped.

PRICE LIST

Thickness inches	List Price per lb.	Thickness inches	List Price per Lb.
.005	\$1.00 per lb.	$\frac{1}{16}$ "	\$.71 per lb.
.010	.84 " "	$\frac{3}{16}$ "	.74 " "
.015	.70 " "	$\frac{1}{8}$ "	.85 " "
$\frac{1}{16}$ to $\frac{1}{4}$ "	.65 " "	$\frac{1}{4}$ "	.95 " "
$\frac{1}{8}$ to $\frac{3}{8}$ "	.66 " "	$\frac{1}{2}$ "	1.25 " "
$\frac{1}{4}$ to $\frac{1}{2}$ "	.69 " "	$1\frac{1}{2}$ "	1.75 " "

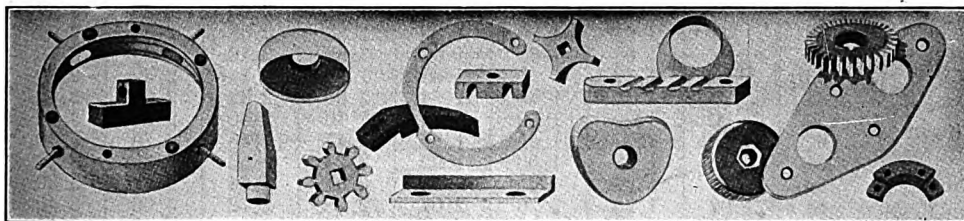


FIG. 1645

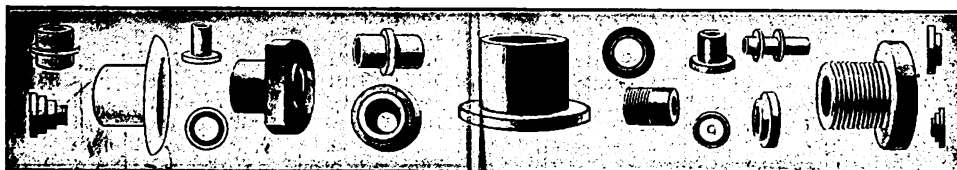


FIG. 1644

TABLE OF AVERAGE WEIGHTS OF SHEETS

Full Sheets Approximately 44x72 inches.

Thickness, inches.....	$\frac{1}{16}$	$\frac{1}{8}$	$\frac{3}{16}$	$\frac{1}{4}$	$\frac{5}{16}$	$\frac{3}{8}$	$\frac{7}{16}$	$\frac{1}{2}$	$\frac{5}{8}$	$\frac{3}{4}$	$\frac{7}{8}$	1	$1\frac{1}{8}$	$1\frac{1}{4}$	$1\frac{1}{2}$					
Weight, pounds.....	2½	5	7½	10	15	20	30	40	50	60	70	80	90	100	120	140	160	180	200	240

A Square foot of one inch thick hard vulcanized fibre weighs about seven pounds. Specific gravity about 1.38. There are approximately 20 cubic inches to a pound.

For cutting sheets $\frac{1}{8}$ -inch and thinner add 10% to list.

For cutting sheets $\frac{1}{4}$ -inch and thicker add 20% to list.

WILMINGTON VULCANIZED FIBRE TUBING

PRICE LIST PER FOOT

Inside Diam.	Thickness of Wall.								
	$\frac{1}{16}$	$\frac{3}{32}$	$\frac{1}{8}$	$\frac{5}{32}$	$\frac{3}{8}$	$\frac{7}{32}$	$\frac{1}{4}$	$\frac{9}{32}$	$\frac{1}{2}$
$\frac{1}{8}$	\$.20	\$.30	\$.40	.....	.....	.....	.....	.....	.....
$\frac{3}{16}$	.20	.30	.40	.....	.....	.....	.....	.....	.....
$\frac{1}{4}$	.10	.14	.18	\$.22	\$.26	.....	.....	.....	.....
$\frac{5}{16}$	.10	.15	.19	.24	.28	.....	.....	.....	.....
$\frac{3}{8}$	.11	.16	.21	.26	.31	.....	.....	.....	.....
$\frac{7}{16}$	.11	.17	.22	.28	.33	.....	.....	.....	.....
$\frac{1}{2}$	.12	.18	.24	.30	.36	\$.42	\$.48	.....	.....
$\frac{9}{16}$	.13	.20	.26	.32	.39	.46	.52	.....	.....
$\frac{5}{8}$	.14	.21	.28	.35	.42	.49	.56	.....	.....
$\frac{11}{16}$	.15	.23	.30	.37	.45	.52	.60	.....	.....
$\frac{3}{4}$	.16	.24	.32	.40	.48	.56	.64	.....	.....
$\frac{7}{8}$	.17	.26	.34	.42	.51	.60	.68	.....	.....
$\frac{15}{16}$	.18	.27	.36	.45	.54	.63	.72	.....	.....
1	.19	.29	.38	.47	.57	.66	.76	.....	.....
$1\frac{1}{8}$	.20	.30	.40	.50	.60	.70	.80	.....	.....
$1\frac{1}{4}$	.22	.33	.44	.55	.66	.77	.88	.....	.....
$1\frac{3}{4}$	.24	.36	.48	.60	.72	.84	.96	.....	.....
$1\frac{5}{8}$	.26	.39	.52	.65	.78	.91	1.04	.....	.....
$1\frac{7}{8}$	.28	.42	.56	.70	.84	.98	1.12	.....	.....
$1\frac{9}{8}$	.30	.45	.60	.75	.90	1.05	1.20	.....	.....
$1\frac{11}{8}$	.32	.48	.64	.80	.96	1.12	1.28	.....	.....
$1\frac{13}{8}$	.34	.51	.68	.85	1.02	1.19	1.36	.....	.....
2	.36	.54	.72	.90	1.08	1.26	1.44	\$1.62	\$1.80
$2\frac{1}{8}$	.38	.57	.76	.95	1.14	1.33	1.52	1.71	1.90
$2\frac{1}{4}$	.40	.60	.80	1.00	1.20	1.40	1.60	1.80	2.00
$2\frac{3}{8}$	.42	.63	.84	1.05	1.26	1.47	1.68	1.89	2.10
$2\frac{1}{2}$	.44	.66	.88	1.10	1.32	1.54	1.76	1.98	2.20
$2\frac{5}{8}$	.46	.69	.92	1.15	1.38	1.61	1.84	2.07	2.30

Inside Diam.	Thickness of Wall										
	$\frac{1}{16}$	$\frac{3}{32}$	$\frac{1}{8}$	$\frac{5}{32}$	$\frac{3}{8}$	$\frac{7}{32}$	$\frac{1}{4}$	$\frac{9}{32}$	$\frac{1}{2}$	$\frac{5}{8}$	$\frac{3}{4}$
$2\frac{3}{4}$	\$.48	\$.72	\$.96	\$1.20	\$1.44	\$1.68	\$1.92	\$2.16	\$2.40	.....	.....
$2\frac{7}{8}$	.50	.75	1.00	1.25	1.50	1.75	2.00	2.25	2.50	.....	.....
3	.52	.78	1.04	1.30	1.56	1.82	2.08	2.34	2.60	\$2.86	\$3.12
$3\frac{1}{8}$	.54	.81	1.08	1.35	1.62	1.89	2.16	2.43	2.70	2.97	3.24
$3\frac{1}{4}$	.56	.84	1.12	1.40	1.68	1.96	2.24	2.52	2.80	3.08	3.36
$3\frac{3}{8}$	.58	.87	1.16	1.45	1.74	2.03	2.32	2.61	2.90	3.19	3.48
$3\frac{1}{2}$	.60	.90	1.20	1.50	1.80	2.10	2.40	2.70	3.00	3.30	3.60
$3\frac{5}{8}$	.62	.93	1.24	1.55	1.86	2.17	2.48	2.79	3.10	3.41	3.72
$3\frac{3}{4}$	.64	.96	1.28	1.60	1.92	2.24	2.56	2.88	3.20	3.52	3.84
$3\frac{7}{8}$	.66	.99	1.32	1.65	1.98	2.31	2.64	2.97	3.30	3.63	3.96
4	.68	1.02	1.36	1.70	2.04	2.38	2.72	3.06	3.40	3.74	4.08
$4\frac{1}{8}$	.70	1.05	1.40	1.75	2.10	2.45	2.80	3.15	3.50	3.84	4.20
$4\frac{1}{4}$	.72	1.08	1.44	1.80	2.16	2.52	2.88	3.24	3.60	3.96	4.32
$4\frac{3}{8}$	.74	1.11	1.48	1.85	2.22	2.59	2.96	3.33	3.70	4.07	4.44
$4\frac{1}{2}$	.76	1.14	1.52	1.90	2.28	2.66	3.04	3.42	3.80	4.18	4.56
$4\frac{5}{8}$	.78	1.17	1.56	1.95	2.34	2.73	3.12	3.51	3.90	4.29	4.68
$4\frac{3}{4}$	.80	1.20	1.60	2.00	2.40	2.80	3.20	3.60	4.00	4.40	4.80
$4\frac{7}{8}$	.82	1.23	1.64	2.05	2.46	2.87	3.28	3.69	4.10	4.51	4.92
5	.84	1.26	1.68	2.10	2.52	2.94	3.36	3.78	4.20	4.62	5.04
$5\frac{1}{8}$	.86	1.29	1.72	2.15	2.58	3.01	3.44	3.87	4.30	4.73	5.16
$5\frac{1}{4}$	.88	1.32	1.76	2.20	2.64	3.08	3.52	3.96	4.40	4.84	5.28
$5\frac{3}{8}$	.90	1.35	1.80	2.25	2.70	3.15	3.60	4.05	4.50	4.95	5.40
$5\frac{1}{2}$	.92	1.38	1.84	2.30	2.76	3.22	3.68	4.14	4.60	5.06	5.52
$5\frac{5}{8}$	.94	1.41	1.88	2.35	2.82	3.29	3.76	4.23	4.70	5.17	5.64
$5\frac{3}{4}$	.96	1.44	1.92	2.40	2.88	3.36	3.84	4.32	4.80	5.28	5.76
$5\frac{7}{8}$	.98	1.47	1.96	2.45	2.94	3.43	3.92	4.41	4.90	5.39	5.88
6	1.00	1.50	2.00	2.50	3.00	3.50	4.00	4.50	5.00	5.50	6.00

A variation of .010" in O. D. is not considered an intermediate size, and may be billed as a standard size.

Rectangular Tubes take double the list price of round.

Tubes cut to exact lengths: price on application.

Intermediate Sizes take price of next larger diameter and next thicker wall, excepting between $\frac{1}{8}$ and $\frac{1}{4}$ I.D., when they take the price of $\frac{3}{8}$.

INTERMEDIATE SIZES

In finding the list price of an intermediate size of tube by the Foot, take the next Larger diameter and next Thicker wall.

FORMULA FOR FINDING WEIGHTS

To find the weight of 100 ft. of tube, use the formula

$$200 T (d+T)$$

in which T = the thickness of wall and d = the inside diameter.

FYBEROID INSULATING PAPER

There are numerous varieties of insulating paper sold under such names as Tarpon Paper, Fish Paper, Insulite, Leatheroid, Peerless Insulation. FYBEROID is undoubtedly the highest quality insulating paper made and by specifying it by name you are assured of the best the market affords.

FYBEROID is strong and tough; it folds and works well; it is free from wrinkles, cuts and flaws, and it is uniform in thickness. This is the material which is used by the leading manufacturers of motors and other electrical apparatus.

Made in thicknesses from .005" to $\frac{1}{8}$ ".

Sheets measure approximately 44" x 66".

.005" to $\frac{1}{8}$ " thick, inclusive..... 50c per lb.

Approximate weights per sheets:

.005 in. thick.....	$\frac{1}{2}$ lb.	$\frac{1}{4}$ in. thick.....	4 lb.
.010 " "	1 $\frac{1}{4}$ "	$\frac{1}{8}$ " "	8 "
.015 " "	2 "	$\frac{1}{8}$ " "	16 "

ELECTRICAL RESISTANCE TESTS

.005" thick.....	1,250 volts	.030" thick.....	15,000 volts
.007" "	2,000 "	.050" "	20,000 "
.010" "	3,500 "	.060" "	25,000 "
.015" "	5,000 "	.085" "	30,000 "
.020" "	7,000 "	.110" "	35,000 "
.025" "	12,000 "	.125" "	40,000 "

ASBESTOS MILL BOARD

SHEETS 40 x 40 INCHES

PRICE LIST

Thickness, Inches	$\frac{1}{16}$	$\frac{3}{16}$	$\frac{1}{8}$	$\frac{5}{16}$	$\frac{1}{4}$	$\frac{3}{8}$	$\frac{1}{2}$
Weight per sheet, lbs.....	3 $\frac{1}{4}$	5 $\frac{1}{4}$	7 $\frac{1}{4}$	9 $\frac{1}{2}$	13	20	31
Price, per pound.....	\$0.30	.30	.30	.30	.30	.30	.30

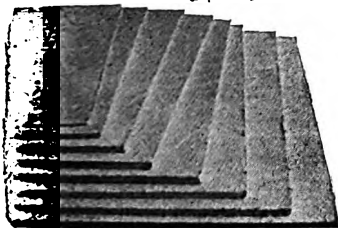


FIG. 1646

FRICTION BOARD

SHEETS 36 x 42 INCHES

Thickness, Inches.....	$\frac{1}{4}$	$\frac{1}{5}$	$\frac{1}{6}$
Price, per pound.....	\$0.26	.26	.26

ASBESTOS SHEATHING

36-INCH ROLLS, ALL WEIGHTS

PRICE LIST

Approximate Thickness, Inches	$\frac{1}{16}$	$\frac{1}{8}$	$\frac{3}{16}$	$\frac{1}{4}$	$\frac{5}{16}$	$\frac{3}{8}$	$\frac{1}{2}$
Weight per 100 sq. ft. lbs.....	8	10	16	21	35	45	65
Price, per pound.....	\$0.27	.27	.27	.27	.27	.28	.36

WHITE AUTO FELT

"REX" BRAND

This is a high grade felt made expressly for the Automobile Trade.

PRICE LIST

IN ROLLS 60 INCHES WIDE

$\frac{1}{4}$ -inch thick, Price per pound.....	\$4.00
$\frac{3}{8}$ -inch thick, Price per pound.....	4.00
$\frac{1}{2}$ -inch thick, Price per pound.....	4.00

IN SHEETS 48 x 48 INCHES

$\frac{1}{4}$ -inch thick, Price per pound.....	4.00
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FIG. 1647

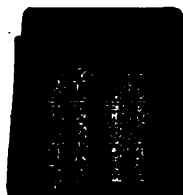


FIG. 1668

TIRE TAPE

ELK BRAND—BLACK

This Friction Tape is manufactured to be water-proof with an adhesion which will stand all altitudes, both in and out of doors, and at the same time give the insulation required. Each coil is put up in tin foil, so that it will not deteriorate with age. $\frac{3}{4}$ -inch wide, $\frac{1}{2}$ -lb. coils. Price each..... \$0.50

THERMOID HYDRAULIC COMPRESSED BRAKE LINING

Thermoid is brake lining all the way through—just the same inside as outside. Therefore it is dependable—has uniform “gripping power” as long as any of it remains.

Thermoid is constructed of long staple Canadian asbestos, interwoven and reinforced with solid brass wire. Under giant heated rolls it is impregnated with a wondrous, secret friction compound—forced through every pore. It is then folded and stitched and compressed and cured for one hour under 2000 pounds hydraulic pressure and at an intense heat.



FIG. 1648

Width Inches	Thickness						Width Inches	Thickness					
	1/8-inch	5/32-inch	3/16-inch	1/4-inch	5/16-inch	3/8-inch		1/8-in. h	5/32-inch	3/16-inch	1/4-inch	5/16-inch	3/8-inch
1	\$0.40	\$0.45	\$0.50	\$0.70	\$0.83	\$0.96	3	\$1.20	\$1.25	\$1.30	\$1.70	\$2.10	\$2.50
1 1/8	.45	.50	.55	.75	.92	1.06	3 1/4	1.25	1.33	1.40	1.80	2.25	2.69
1 1/4	.50	.55	.60	.80	.98	1.16	3 1/2	1.30	1.40	1.50	1.90	2.39	2.88
1 1/2	.60	.65	.70	.90	1.13	1.35	3 3/4	1.35	1.48	1.60	2.05	2.57	3.08
1 3/4	.70	.75	.80	1.00	1.27	1.54	4	1.40	1.55	1.70	2.20	2.74	3.27
2	.80	.85	.90	1.20	1.47	1.73	4 1/2	1.60	1.75	1.90	2.50	3.08	3.65
2 1/4	.90	.95	1.00	1.30	1.62	1.93	5	1.80	1.95	2.10	2.70	3.37	4.04
2 1/2	1.00	1.05	1.10	1.50	1.81	2.12	5 1/2	2.00	2.15	2.30	3.01	3.72	4.42
2 3/4	1.10	1.15	1.20	1.60	1.96	2.31	6	2.20	2.35	2.50	3.27	4.04	4.80

Sizes indicated by bold-faced type represent those sizes which have been approved by the Society of Automobile Engineers as “Standard.” Any sizes other than “Standard” must be considered as special.

FORDOID TRANSMISSION COMPRESSED BRAKE LINING

Constructed especially for use upon transmission brakes on Ford cars. It is regular Thermoid Brake Lining except made with out wire. Cannot short circuit the magneto. Not affected by heat, oil, dirt, gasoline or water. Packed in pasteboard cartons. One set of three pieces to the box, including rivets, length 23 1/2 inches, width 1 1/8 inches, thickness 3/8 inch. List Price (Per Set of Three Pieces Complete with Rivets).....\$3.00

J-M NON-BURN BRAKE LINING

Non-Burn is woven in one piece from superior long-fibre Asbestos, reinforced with wire interwoven in each strand, to the required width and thickness, and impregnated with chemicals which increase its naturally high resistance to the action of oil, grease, water and gasoline and which also materially increase and preserve its frictional qualities.

SIZES AND LIST PRICES—PER FOOT

Width, Inches	1	1 1/4	1 1/2	1 3/4	2	2 1/4	2 1/2	2 3/4	3	3 1/2
Thickness—1/8-in.	\$0.40	\$0.50	\$0.60	\$0.70	\$0.80	\$0.90	\$1.00	\$1.10	\$1.20	\$1.25
3/8-in.	.45	.55	.65	.75	.85	.95	1.05	1.15	1.25	1.35
1/2-in.	.50	.60	.70	.80	.90	1.00	1.10	1.20	1.30	1.40
5/8-in.	.70	.80	.90	1.00	1.20	1.30	1.50	1.60	1.70	1.80
3/4-in.	.80	.94	1.11	1.26	1.41	1.56	1.72	1.87	2.02	2.17
7/8-in.	.96	1.16	1.35	1.54	1.73	1.92	2.12	2.31	2.50	2.69
1-in.	1.22	1.48	1.73	1.99	2.24	2.50	2.76	3.01	3.27	3.52



FIG. 1649

Width, inches	3 1/2	3 3/4	4	4 1/4	4 1/2	4 3/4	5	5 1/4	5 1/2	5 3/4	6
Thick.—1/8-in.	\$1.30	\$1.35	\$1.40	\$1.73	\$1.80	\$1.86	\$1.92	\$2.02	\$2.12	\$2.21	\$2.27
3/8-in.	1.45	1.50	1.55	1.85	1.94	2.03	2.11	2.21	2.31	2.40	2.49
1/2-in.	1.50	1.60	1.70	1.97	2.08	2.19	2.29	2.40	2.50	2.60	2.71
5/8-in.	1.90	2.05	2.20	2.37	2.50	2.63	2.70	2.88	3.01	3.14	3.27
3/4-in.	2.21	2.31	2.50	2.71	2.92	3.07	3.22	3.36	3.52	3.67	3.82
7/8-in.	2.88	3.08	3.27	3.46	3.65	3.84	4.04	4.23	4.42	4.61	4.80
1-in.	3.78	4.04	4.29	4.55	4.80	5.06	5.32	5.57	5.83	6.08	6.34

J-M NON-BURN FORD SPECIAL BRAKE LINING

On Ford cars the foot-brake is located just back of the engine, and enclosed in the transmission case with the low-speed clutch and the reverse clutch. The case is filled with lubricating oil and the lining of the foot-brake is always saturated with oil which sometimes becomes extremely hot.

Non-Burn Brake Lining FORD SPECIAL (Style XX) meets these unusual conditions and gives excellent braking service. (STYLE XX)

Size 1 1/8-inch wide by 1/2-inch thick. [In rolls, Price per foot.....\$0.10
In cartons containing three pieces 23 3/4-inches by 1 1/8 inch by 1/2-inch. Price each.....2.10]

STYLE F

Made of tough cotton fabrics. The same dimensions as Style XX.

Price, per foot.....\$0.10
Price, per carton.....1.10

LEATHER BELTING



FIG. 1650½
BEAR BRAND
FOR REGULAR SERVICE



FIG. 1651

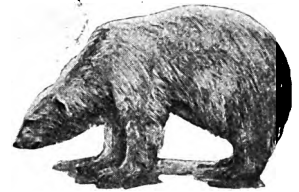


FIG. 1651½
POLAR BEAR BRAND
FOR WET PLACES

We carry in stock leather belting for every service. Our leather belting is the best that can be obtained for the service for which it is recommended.

We have special brands of water-proof and steamproof belting.

Our best grade of belt is made to give the longest life and greatest durability under the most severe conditions. We also have several other qualities of belting to be used where our best grade of belting is not required.

BURMALINE BELTING

A BELT WITH NO COMEBACKS—A HARD SERVICE BELT

Will absolutely take the place of Leather Belting on any drive where there is no water. It will cut down your belt cost about 33 1/3%. It will stand excessive heat. It is not affected by oil. It has less stretch than Leather. It will run absolutely straight on the pulleys and will develop a trifle more horse power than the same thickness of Leather Belting. It is not affected by a shifter; in other words, it will not fray on the edges if subjected to a shifter. It can be fastened with any kind of a belt fastener. It can be run satisfactorily as a straight or crossed belt. In order to give satisfaction it must be operated the stenciled side to the pulley. Burmaline Belting has a greater breaking strain than any other make of belting on the market and is made in one piece, so that there is no weak point to it.



FIG. 1652

PRICE LIST OF LEATHER BELTING AND BURMALINE BELTING

Price per Foot			Price per Foot			Price per Foot		
Width Inches	Single	Double	Width Inches	Single	Double	Width Inches	Single	Double
1½	\$.12	\$.24	6½	\$1.56	\$3.12	27	\$6.48	\$12.96
5/8	.15	.30	7	1.68	3.36	28	6.72	13.44
¾	.18	.36	8	1.92	3.84	29	6.96	13.92
7/8	.21	.42	9	2.16	4.32	30	7.20	14.40
1	.24	.48	10	2.40	4.80	32	7.68	15.36
1¼	.30	.60	11	2.64	5.28	34	8.16	16.32
1½	.36	.72	12	2.88	5.76	36	8.64	17.28
1¾	.42	.84	13	3.12	6.24	38	9.12	18.24
2	.48	.96	14	3.36	6.72	40	9.60	19.20
2¼	.54	1.08	15	3.60	7.20	42	10.08	20.16
2½	.60	1.20	16	3.84	7.68	44	10.56	21.12
2¾	.66	1.32	17	4.08	8.16	46	11.04	22.08
3	.72	1.44	18	4.32	8.64	48	11.52	23.04
3¼	.78	1.56	19	4.56	9.12	50	12.00	24.00
3½	.84	1.68	20	4.80	9.60	52	12.48	24.96
3¾	.90	1.80	21	5.04	10.08	54	12.96	25.92
4	.96	1.92	22	5.28	10.56	56	13.44	26.88
4½	1.08	2.16	23	5.52	11.04	60	14.40	28.80
5	1.20	2.40	24	5.76	11.52	64	15.36	30.72
5½	1.32	2.64	25	6.00	12.00	68	16.32	32.64
6	1.44	2.88	26	6.24	12.48	72	17.28	34.56

RUBBER BELTING

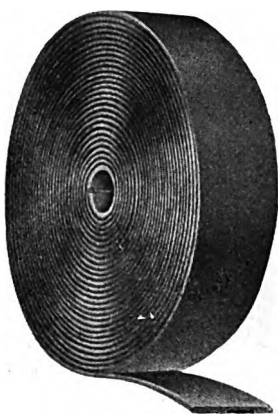


FIG. 1653

More belts and machinery are injured by lack of proper understanding of this subject, than by any other cause. Vertical belts require extra (not excessive) tension, as it is necessary to obtain sufficient friction on the lower pulley. As far as possible avoid vertical transmission.

There are no absolute rules on this subject, as the conditions under which belts are used vary in many respects. From observations made by engineers we suggest the following schedule:

For 3-ply belt, 30 to 40 lbs. per inch of width of belt.

" 4 "	" 50 "	" 70 "	" " "	" " "	" " "
" 5 "	" 70 "	" 90 "	" " "	" " "	" " "
" 6 "	" 90 "	" 110 "	" " "	" " "	" " "
" 7 "	" 110 "	" 130 "	" " "	" " "	" " "
" 8 "	" 130 "	" 150 "	" " "	" " "	" " "

Care should be taken that the tension is never sufficient to heat the bearings. Excessive tension is injurious.

Comparative strength of rubber to leather belting:

4-ply rubber equal to single leather.

6 " " " " light double leather.

8 " " " " heavy double leather.

10 " " " " triple leather.

6-ply rubber transmits fifty per cent more horse power than 4-ply. 8-ply transmits one hundred per cent more horse power than 4-ply.

PRICE LIST OF RUBBER BELTING

Width in Ins.	2 ply per ft.	3 ply per ft.	4 ply per ft.	5 ply per ft.	6 ply per ft.	7 ply per ft.	8 ply per ft.	9 ply per ft.	10 ply per ft.
1	\$.18	\$.20	\$.24						
1 1/4	.23	.26	.30						
1 1/2	.27	.31	.36	\$.45					
1 3/4	.32	.36	.42	.53					
2	.34	.39	.46	.58	\$.69				
2 1/4	.42	.48	.56	.70	.84				
3	.48	.55	.65	.81	.98				
3 1/4	.57	.65	.76	.95	1.14				
4	.61	.70	.82	1.03	1.23	\$ 1.44			
4 1/4		.78	.92	1.15	1.38	1.61			
5		.87	1.02	1.28	1.53	1.79			
6		1.04	1.22	1.53	1.83	2.14	\$ 2.44	\$ 2.75	\$ 3.06
7		1.22	1.43	1.79	2.15	2.50	2.86	3.22	3.58
8		1.31	1.54	1.93	2.31	2.70	3.08	3.47	3.86
9			1.73	2.16	2.60	3.03	3.46	3.89	4.32
10			1.92	2.40	2.88	3.36	3.84	4.32	4.80
11			2.11	2.64	3.17	3.69	4.22	4.75	5.28
12			2.30	2.88	3.45	4.03	4.60	5.18	5.76
13			2.50	3.13	3.75	4.38	5.00	5.63	6.26
14			2.69	3.36	4.04	4.71	5.38	6.05	6.72
15			2.88	3.60	4.32	5.04	5.76	6.48	7.20
16			3.08	3.86	4.62	5.40	6.16	6.94	7.72
18			3.46	4.32	5.20	6.06	6.92	7.78	8.64
20			3.84	4.80	5.76	6.72	7.68	8.64	9.60
22			4.22	5.28	6.34	7.38	8.44	9.50	10.56
24			4.60	5.76	6.90	8.06	9.20	10.36	11.52
26				6.26	7.50	8.76	10.00	11.26	12.52
28				6.72	8.08	9.42	10.76	12.10	13.44
30				7.20	8.64	10.08	11.52	12.96	14.40
32				7.72	9.24	10.80	12.32	13.88	15.44
34				8.18	9.82	11.46	13.08	14.72	16.36
36				8.64	10.40	12.12	13.84	15.56	17.28

REX RED STITCHED CANVAS BELTING

PRICE LIST

WIDTH Inch	PRICE PER FOOT				
	4-Ply	5-Ply	6-Ply	8-Ply	10-Ply
1	\$ 1.20	.....	.....	.....	.....
1 1/4	.30	.....	.....	.....	.....
2	.39	\$.49	\$.59	.....	.....
2 1/4	.48	.60	.72	.....	.....
3	.57	.71	.86	.....	.....
3 1/4	.65	.81	.98	.....	.....
4	.74	.93	1.11	\$ 1.48	.....
4 1/4	.81	1.01	1.22	1.62	.....
5	.90	1.13	1.35	1.80	.....
6	1.05	1.31	1.58	2.10	.....
7	1.20	1.50	1.80	2.40	.....
8	1.35	1.69	2.03	2.70	.....
9	1.49	1.86	2.24	2.98	.....
10	1.62	2.03	2.43	3.24	.....
11	1.76	2.20	2.64	3.52	.....
12	2.05	2.57	3.08	4.10	\$ 5.13
13	2.15	2.69	3.23	4.30	5.37
14	2.31	2.90	3.47	4.62	5.78
15	2.48	3.09	3.72	4.96	6.20
16	2.64	3.30	3.96	5.28	6.60
18	2.97	3.72	4.46	5.94	7.43
20	3.30	4.13	4.95	6.60	8.25
22	3.63	4.55	5.45	7.26	9.08
24	3.96	4.95	5.94	7.92	9.90
26	4.68	5.85	7.02	9.36	11.70
28	5.04	6.30	7.56	10.08	12.60
30	5.40	6.75	8.10	10.80	13.50
32	5.76	7.20	8.64	11.52	14.40
34	6.12	7.65	9.18	12.24	15.30
36	6.48	8.10	9.72	12.96	16.20
38	7.41	9.27	11.12	14.32	18.53
40	7.80	9.75	11.70	15.60	19.50
42	8.19	10.25	12.29	16.38	20.48
44	8.58	10.73	12.87	17.16	21.45
46	8.97	11.22	13.46	17.94	22.43
48	9.36	11.70	14.04	18.72	23.40

Charge for Splice on Endless Belts. All belts 16 inches wide or under, seven feet is the minimum charge. Belts over 16 inches wide, the charge is to be the equivalent of five times the width of the belt.



FIG. 1654

BALATA BELTING

A TRUE SEAMLESS BELT

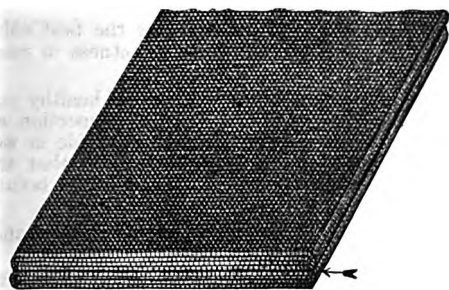


FIG. 1655

Balata by nature has an unusual power of penetration, so that the structure body of a belt is more thoroughly filled, saturated and thus more homogeneous than belting constructed of any other material.

Balata is water-proof and reasonably oil-proof. It has an extremely high binding tendency; still it will not crack, break or dry out. In other words Balata Belting is not affected by age, and at the same time its physical properties, as previously suggested, insure a minimum of stretch and maximum of strength.

Balata Belting is not recommended when operating temperatures exceed 125 degrees Fahrenheit.

SOLID OAK-TANNED ROUND LEATHER

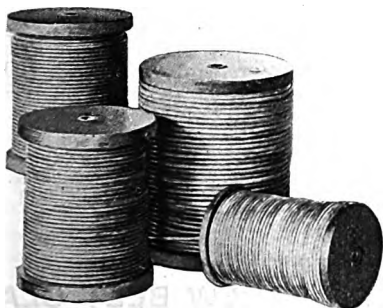


FIG. 1656

Made of solid backbone stock, from choicest cold-country hides. In coils or spools.

PRICE LIST

Diam. inch	Price per foot
$\frac{1}{8}$	.14
$\frac{1}{4}$	.20
$\frac{3}{8}$	.28
$\frac{1}{2}$	.36

PRICE LIST

Width Inch	PRICE PER FOOT					
	3-Ply	4-Ply	5-Ply	6-Ply	7-Ply	8-Ply
1	\$.18	\$.24	....	....	....	....
1 $\frac{1}{4}$	.23	.30	....	....	....	....
1 $\frac{1}{2}$	.27	.36	....	....	....	....
1 $\frac{3}{4}$	.32	.42	....	....	....	....
2	.36	.48	\$.60	....	....	....
2 $\frac{1}{4}$	.41	.54	.68	....	....	....
2 $\frac{1}{2}$	.45	.60	.75	....	....	....
2 $\frac{3}{4}$	.50	.66	.83	....	....	....
3	.54	.72	.90	....	....	....
3 $\frac{1}{2}$	.63	.84	1.05	....	....	....
4	.72	.96	1.20	....	....	....
4 $\frac{1}{2}$	.81	1.08	1.35	....	....	....
5	.90	1.20	1.50	\$. ....	....	....
6	1.08	1.44	1.80	2.16	....	....
7	1.26	1.68	2.10	2.52	\$2.94	\$3.36
8	1.44	1.92	2.40	2.88	3.36	3.84
9	1.62	2.16	2.70	3.24	3.78	4.32
10	1.80	2.40	3.00	3.60	4.20	4.80
11	1.98	2.64	3.30	3.96	4.62	5.28
12	2.16	2.88	3.60	4.32	5.04	5.76
13	2.34	3.12	3.90	4.68	5.46	6.24
14	2.52	3.36	4.20	5.04	5.88	6.72
15	2.70	3.60	4.50	5.40	6.30	7.20
16	2.88	3.84	4.80	5.76	6.72	7.68
18	3.24	4.32	5.40	6.48	7.56	8.64
20	3.60	4.80	6.00	7.20	8.40	9.60
22	3.96	5.28	6.60	7.92	9.24	10.56
24	4.32	5.76	7.20	8.64	10.08	11.52

TWIST LEATHER

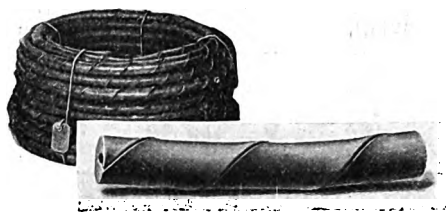


FIG. 1657

Used with Moran coupling, this Twist Round Leather Belting is easily shortened by uncoupling, twisting the belt more tightly, and rehooking the coupling. In coils or spools.

PRICE LIST

Diameter, Inches	$\frac{1}{8}$ "	$\frac{1}{4}$ "	$\frac{3}{8}$ "	$\frac{1}{2}$ "	$\frac{3}{4}$ "	$\frac{1}{2}$ "	$\frac{3}{8}$ "
Price per Foot	\$.08	.12	.17	.22	.27	.32	.37
Diameter, Inches	$\frac{1}{2}$ "	$\frac{3}{4}$ "	$\frac{1}{2}$ "	$\frac{3}{8}$ "	$\frac{1}{4}$ "	$\frac{1}{8}$ "	$\frac{3}{16}$ "
Price per Foot	\$.38	.48	.60	.80	.96	1.12	1.28

RAWHIDE ROPE

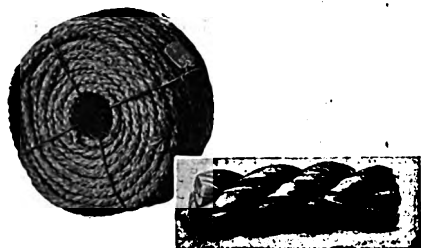


FIG. 1658

Unexcelled. Has great tensile strength and wearing qualities. Put up in coils.

PRICE LIST

Diameter, Inches	$\frac{1}{4}$ "	$\frac{1}{2}$ "	$\frac{3}{8}$ "	$\frac{1}{2}$ "	$\frac{5}{8}$ "	$\frac{3}{4}$ "	$\frac{7}{8}$ "	1"
Price per Foot	\$.14	.19	.25	.32	.38	.47	.56	.65

LACE LEATHER

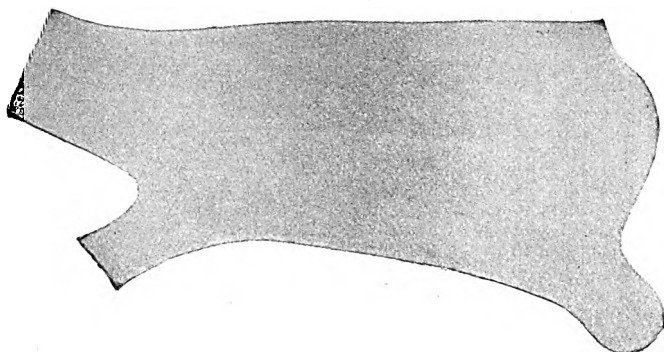


FIG. 1659

Our extra-close trimmed sides give the best value; and as each side is measured mechanically, exactness in measurement is assured.

Lace Leather comes from the hides of healthy young cows, taken off in the best months. To pass inspection every hide must be perfect. During processing each hide is worked and re-worked, stretched and extra-stretched, so that the side as sold represents a finished product, unrivalled in texture, toughness and "feel".

Sold by the square foot, in whole sides only, and in three weights:—

Light Weight, in small sides, area 10 to 12 sq. ft.

Medium Weight, in medium sides, area 12 to 16 sq. ft.

Heavy Weight, in large sides, area 15 to 18 sq. ft.

CUT LACING

The logical way to join belts is with rawhide lacing. It is the old tried method, and has stood the test of years. But often there is a tendency to use cheap lacing. Then the lace must be wider, and larger holes are made in the belt. These holes become larger with use, and the belt goes to pieces at the joint. The extra cost of good lacing is small, but the saving to the belt is great; so it pays times over to pay more and get the best lace obtainable. Let the quality of the lace be better, and let the width be narrower.

It is at the joint that the belt is weakest. Like a chain it can be no stronger than its weakest part. So we cannot recommend too strongly the best lace possible to obtain.

"CUT FROM BACKS"



FIG. 1660

Each lace is hand-cut
Each lace is extra-stretched
Each lace is long and perfect

GENERAL CUT-LACE PRICE LIST
PER 100 FEET

Width	Price Per 100 feet	Width	Price Per 100 feet
$\frac{1}{4}$ "	\$2.50	$\frac{5}{8}$ "	\$6.50
$\frac{3}{8}$ "	3.00	$\frac{3}{4}$ "	7.50
$\frac{1}{2}$ "	3.75	$\frac{7}{8}$ "	9.00
$\frac{5}{8}$ "	4.50	1"	11.00
$\frac{3}{4}$ "	5.50		

STEEL COUPLINGS

FOR ALL ROUND LEATHER BELTING



FIG. 1675

SIZES ARE OUTSIDE DIAMETERS

In ordering state diameter of round belt for which coupling is intended. The belt itself is reduced to fit the coupling snugly.

PRICE LIST PER DOZEN PAIR

Size	Price	Size	Price
$\frac{1}{8}$	\$3.00	$\frac{1}{4}$	\$3.50
$\frac{1}{4}$	2.50	$\frac{1}{2}$	4.00
$\frac{3}{8}$	2.00	$\frac{3}{4}$	6.00
$\frac{1}{2}$	2.50	$\frac{7}{8}$	9.00
$\frac{3}{4}$	2.50	1	13.00
1	3.00		18.00

IRON SCREW BELT CLAMP

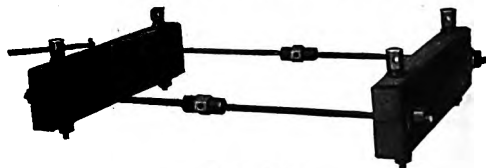


FIG. 1680

The frame is made of rock maple, with jaws corrugated which makes it practically impossible for belt to slip after having been properly placed in clamp.

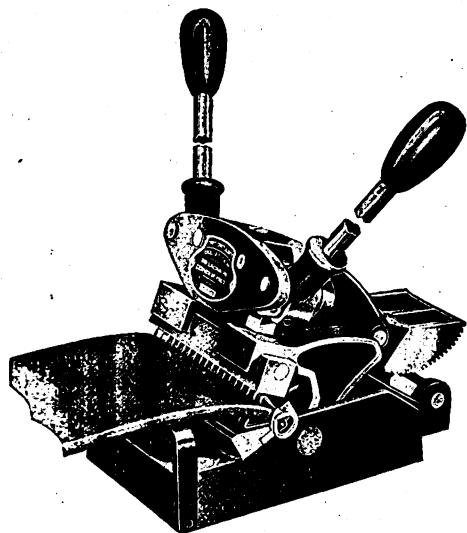
The screws have square threads and rapid pitch and are made of wrought iron.

These clamps are used for tightening and putting together large belts, and combine strength, simplicity and convenience. A clamp will frequently pay for itself after one or two belts have been taken up.

PRICE LIST

No. 270	No. 271	No. 272	No. 273
Belt 6 to 12 In.	Belt 12 to 18 In.	Belt 18 to 24 In.	Belt 24 to 36 In.
\$16.00	\$20.00	\$24.00	\$36.00

CLIPPER BELT LACERS



NO. 3 IN OPERATION—FIG. 1681

NO. 3

No. 3 is a 24 pound machine which can be carried to the belt. Will lace any width or thickness of belt. The lacing may be made without removing the belt from the shaft. It is built of the strongest and best materials and all parts are interchangeable. Price each..... \$25.00

RAWHIDE AND "FIBRO" PINS

Twisted Rawhide and "Fibro" Waterproof Pins are separately packed in standard bundles as listed. Each bundle contains 24 pins 12 inches long.



FIG. 5014

"Fibro" Waterproof Pins are especially suitable for use in wet or steamy places, laundries, creameries, etc.

Being brittle, "Fibro" Pins are not practical on quarter-turn belts, belts shifted quickly from tight to loose pulleys, belts running on cone pulleys, or belts that are likely to climb a flange. Twisted Rawhide Pins will give satisfactory results if used under these conditions.

Size No.	Diameter	For	Price per Bundle	
			"Fibro"	Rawhide
13	1/16 inch, very thin belts, Nos. 2 and 3 hooks		\$0.35	\$0.70
12	1/8 inch, No. 4 hooks		.35	.70
11	3/16 inch, No. 5 hooks		.35	.70
10	1/4 inch, No. 5 hooks		.40	.80
9	5/16 inch, No. 6 hooks		.45	.90
8	3/8 inch, No. 6 hooks		.50	1.00
7	1/2 inch, heavy belts		.60	1.20
5	3/4 inch, heavy belts		.70	1.60
	Assorted sizes, Nos. 8 to 13		.40	.75

Clipper Lacers are for belts of every kind and thickness. Make a smooth, flexible joint that will not tear or pull out. Made of crucible steel, malleable iron and tool steel—all working parts interchangeable. So quick and simple in operation that any workman can make a lacing in three minutes.

BABY NO. 0

The Baby No. 0 can be used in any ordinary vise. It is adapted for lacing belts not exceeding four inches in width.

The hooks are inserted and held in place the same as with the No. 3 Lacer. As the jaws of the vise are brought together the hooks are pressed into the squared belt end, and the lacing when completed is identical with that made with the No. 3 Lacer.

This small belt lacer is not intended to take the place of the No. 3 but to supplement it. In garages and tool rooms—wherever there is access to a vise—Baby No. 0 quickly proves its usefulness.

Price each (not including vise)..... \$6.50

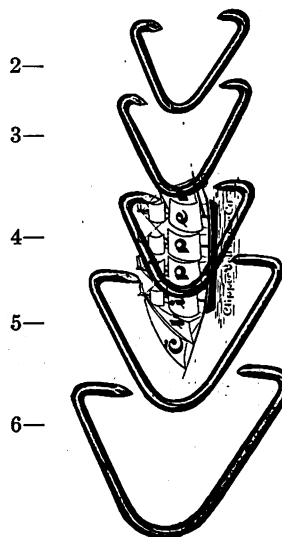
"CLIPPER" BELT HOOKS

Made from a special steel wire which combines great tensile strength and ability to withstand fatigue. Actual tests have proved that each hook will stand a pulling strain of 60 pounds, equal to over 400 pounds per inch of belt. A card of "Clipper" Hooks can easily be slipped into the lacer.



FIG. 1683

Cards hold 37 hooks each and are packed 27 cards (one size) in a box with 14 twisted rawhide pins. Each box will lace 80 inches—total width—both ends of belt.



ACTUAL SIZE OF HOOKS—FIG. 1682

No. 2—For thin belts over small sized pulley.
 Price per box..... \$1.00
 No. 3—For thin belts over medium sized pulley.
 Price per box..... 1.25
 No. 4—For belts not over 1/4 inch thick.
 Price per box..... 1.25
 No. 5—For belts not over 5/8 inch thick.
 Price per box..... 1.50
 No. 6—For belts not over 3/8 inch thick.
 Price per box..... 1.75

BRISTOL BELT LACING



READY TO APPLY FINISHED JOINT
NOS. 0 TO 3—FIG. 1672



READY TO APPLY FINISHED JOINT
NOS. 10 TO 15—FIG. 1673



NOS. 111 TO 117—FIG. 1674

FOR LEATHER BELTS

Cold rolled steel, smooth, elastic joints; does not cut belt fabrics; box contains enough to lace 100 inches belt width.

- No. 0—For split leather and light belts, $\frac{1}{8}$ to $\frac{3}{16}$ inch thick; Weight per box $\frac{1}{2}$ pound. \$1.00
 No. 1—For ordinary single leather belts, $\frac{3}{16}$ to $\frac{1}{4}$ inch thick; Weight per box 1 pound. 1.50

- No. 2—For extra heavy and wide single leather belts, $\frac{1}{4}$ to $\frac{5}{16}$ inch thick; Weight per box $1\frac{1}{2}$ pounds. \$2.00
 No. 3—For double leather belts, $\frac{5}{16}$ to $\frac{3}{8}$ inch thick; Weight per box $2\frac{1}{4}$ pounds. 2.50

FOR RUBBER AND WOVEN BELTS

No.	Belts Ply	Thickness Inches	Wt. Box Lbs.	Price Per Box
10	2	$\frac{1}{8}$ to $\frac{3}{16}$	$\frac{2}{3}$	\$1.00
11	3	$\frac{3}{16}$ to $\frac{1}{4}$	$1\frac{1}{4}$	1.50
12	4	$\frac{1}{4}$ to $\frac{5}{16}$	$2\frac{1}{4}$	2.00
13	5	$\frac{5}{16}$ to $\frac{3}{8}$	$3\frac{1}{4}$	2.50
14	6	$\frac{3}{8}$ to $\frac{7}{16}$	4	3.00
15	7	$\frac{7}{16}$ to $\frac{1}{2}$	$5\frac{1}{4}$	3.50

100 inches in a box.

FOR ALL KINDS OF BELTING

No.	For Belts, Inches	Wt. Box Lbs.	Price Per Box
111	$\frac{3}{16}$ to $\frac{1}{4}$	$1\frac{1}{4}$	\$1.50
112	$\frac{1}{4}$ to $\frac{5}{16}$	$2\frac{1}{4}$	2.00
113	$\frac{5}{16}$ to $\frac{3}{8}$	$3\frac{1}{4}$	2.50
114	$\frac{3}{8}$ to $\frac{7}{16}$	4	3.00
115	$\frac{7}{16}$ to $\frac{1}{2}$	5	3.50
117	$\frac{1}{2}$ to $\frac{5}{8}$	6	4.95

Assorted lengths (100 Inches) in a box.

ALLIGATOR BELT LACING

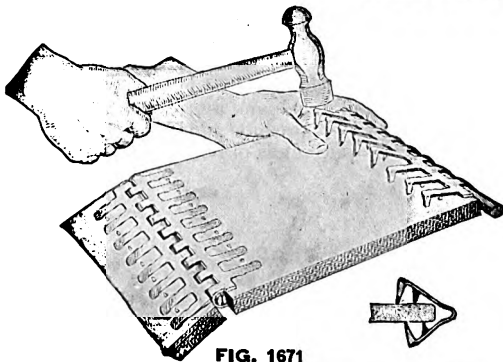


FIG. 1671

A smooth separable hinge joint of extreme strength. Protects ends of fabric belts and allows any belt to be used with an idler pulley.

No tool required but a hammer.

Packed in boxes complete with hinge pins as follows:

ROCKER HINGE PINS

Rawhide hinge pins give good results where work is dry and service moderate, but for heavy duty or wet conditions we recommend the rocker hinge pin, which is formed of two pieces of oval wire which rock against each other and have lugs on back to hold them in place. We pack rawhide pins only on Nos. 00 and 15, either rocker or rawhide pins in Nos. 20, 27, 35 and 45, while on Nos. 55, 65 and 75 the rocker hinge pin only is packed. Alligator Lacing Sections are easily broken to fit any belt without waste of material.

Box Number	Lacing Number	Thickness of Belt Inches	Description	Length of Section Inches	Width of Belt will Lace Inches	Price per Box
..	00	up to $\frac{1}{8}$	Printers' Tapes and other Tape Belts.	6	72	\$2.60
..	15	$\frac{1}{8}$ " $\frac{3}{16}$	Light Single Leather, 1 to 2 inches Wide.	8	64	2.60
..	20	$\frac{3}{16}$ " $\frac{1}{4}$	Single Leather, 3-ply Rubber and Fabric Belts.	12	60	2.60
F	25	$\frac{1}{4}$ " $\frac{5}{16}$	Medium and Heavy Single Leather, 3-ply Rubber } or Light 4-ply Cotton.	8	48	2.50
G	25	$\frac{1}{4}$ " $\frac{5}{16}$	4-ply Rubber or Cotton.	12	96	5.00
L	27	$\frac{1}{4}$ " $\frac{5}{16}$	Light Double Leather, 5-ply Rubber and 5 to 6-ply Cotton.	12	96	5.30
M	35	$\frac{5}{16}$ " $\frac{3}{8}$	Heavy Double Leather, 6-ply Rubber and Cotton } Wide Heavy Double Leather, 6 or 7-ply Rubber } and 7-ply Cotton.	8	32	2.30
N	35	$\frac{5}{16}$ " $\frac{3}{8}$	Extra Heavy and Wide Double Leather, 7 and 8-ply Rubber and 8-ply Cotton.	12	48	3.40
U	45	$\frac{3}{8}$ " $\frac{1}{2}$	10-ply Rubber or Cotton.	12	48	4.50
W	55	$\frac{3}{8}$ " $\frac{1}{2}$				
X	65	$\frac{1}{2}$ " $\frac{5}{8}$				
..	75	$\frac{1}{2}$ " $\frac{5}{8}$				

EXTRA HINGE PINS THAT CAN BE CUT TO SUIT

Price, $\frac{1}{8}$ -inch Rawhide Pin only, for No. 15 Lacing, 8 inches Long.	per dozen	\$0.
Price, $\frac{3}{16}$ -inch Rawhide or Steel Rocker Pins, for Nos. 20 and 25 Lacing, 12 inches Long.	"	0.
Price, $\frac{1}{4}$ -inch Rawhide or Steel Rocker Pins, for No. 27 Lacing, 12 inches Long.	"	1.
Price, $\frac{5}{16}$ -inch Rawhide or Steel Rocker Pins, for No. 35 Lacing, 12 inches Long.	"	1.
Price, $\frac{3}{8}$ -inch Rawhide or Steel Rocker Pins, for No. 45 Lacing, 12 inches Long.	"	1.
Price, Steel Rocker Pins only, for Nos. 55 or 65 Lacing.	"	1.
Price, Steel Rocker Pins only, for No. 75 Lacing.	"	1.

KERR'S WIRE BELT LACING



FIG. 1676

Size No.	Each size is packed in boxes containing 50 feet.	Price Per 100 Feet
00—	For light single belts up to 1 inch.....	\$2.00
0—	For single belts up to 3 inches in width.....	2.00
1—	For single belts, 3 to 6 inches in width.....	2.00
2—	For single belts, 6 to 12 inches in width, and double belts up to 6 inches in width.....	2.00
3—	For all double belts over 6 inches in width....	2.00

COVEL BELT FASTENERS

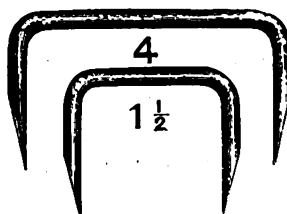


FIG. 1678

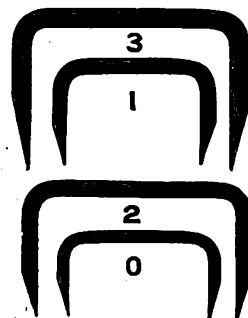


FIG. 1679

Made in six sizes: Nos. 0, 1, 1½, 2, 3 and 4, the No. 0 being the smallest size, and No. 4 the largest size.

Price, per thousand..... \$2.50
Put up in boxes of 200 in each.

DIXON'S BAR BELT DRESSING



FIG. 5015

A solid bar dressing for leather, canvas or rubber belts. Prolongs the life of belting and prevents slipping. In one pound bars 2 x 8 inches.

Price per bar..... \$0.75

"POWER" BAR BELT DRESSING

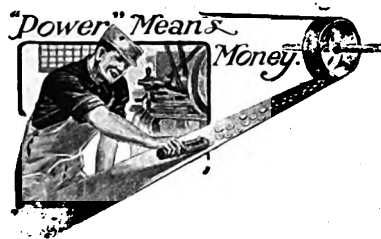


FIG. 1669

Makes overtaxed belts pick right up and carry the load without apparent effort.

For preserving the leather and avoids the necessity of using tight belts.

Good for leather, cotton or rubber.

Directions—If your belt is slipping or is dry and requires dressing, press the end of a bar of power dressing against the belt while in motion and hold there until the entire belt is dressed. If you want to prevent moisture from affecting your belt, dress the sides.

Price per bar..... \$1.00

CLING-SURFACE BELT DRESSING



FIG. 1670

Cling-Surface is not a sticky belt dressing, not a belt dressing at all, in fact, but a special treatment for special results.

It penetrates into porous belts and ropes, making and keeping them pliable, firm and waterproof all through and leaving the surface clean, so the whole belt grips the pulley and is in best health always.

It stops all slipping without stickiness, so every belt can be run easy or slack, as shown in cut, with minimum friction and maximum output, saving oil, power, time, work, worry and fuel.

It can be used for all sorts of belts and ropes and will preserve leather, cotton, camel hair and manila belts and ropes and will not injure good rubber or balata if properly used. It is being used widely in almost every manufacturing country, and you will find it to give you the results you want.

Put up in 10, 25 and 50 lb. tight cans. Can be used cold.

Price per pound..... \$1.00

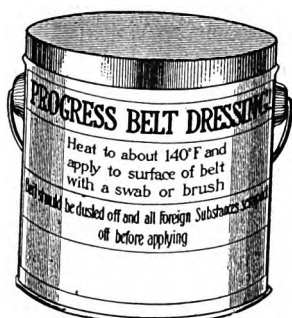
BELT DRESSING**PROGRESS BRAND
PASTE FORM**

FIG. 1666

This belt dressing is made of a combination of greases and oils that are beneficial to leather. It is applied hot with a swab and belts treated with same will become pliable and transmit the maximum amount of horsepower. This dressing also makes the belt fairly waterproof.

Put up in five pound cans.

5 Pound Cans,
Price each..... \$2.10

**NEUTRO BRAND
LIQUID FORM**

FIG. 1667

This belt dressing is made of a combination of oils and tallow from which the acids have been neutralized. Preserves the leather and makes it waterproof. Belts so treated will not burn as readily on heated pulleys as those not so treated. Put up in eight and forty pound cans.

8 Pound Cans, Price each..... \$ 3.10
40 Pound Cans, Price each..... 19.40

BELT CEMENT**GOLDEN STATE BRAND**

FIG. 1664

Made of the purest Coignet (French) Glue obtainable, and tempered with a mixture of Fish Glue or Isinglass. This cement is applied hot and if used according to instructions will produce best results. Put up in one pound cans.

1 Pound Cans,
Price each..... \$1.20

**ROYAL WORCESTER BRAND
GELATINE FORM**

FIG. 1661

Will not deteriorate with air or extremes of climate. It is very quickly, enabling a belt to be put in operation with the least possible delay. This cement is prepared in gelatine form and for use should be reduced with hot water to the consistency of light molasses. It is put up in both one and five pound cans.

1 Pound Cans, Price Each \$1.20
5 Pound Cans, Price Each 6.00

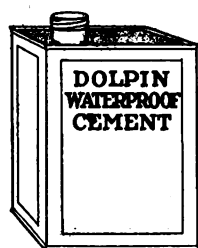
**FOR WATER-PROOF LEATHER BELTING
DOLPHIN BRAND**

FIG. 1665

This cement is used in the manufacture of Dolphin Waterproof Cement Belt. It is insoluble in water, and belts that are operated in a damp or wet place should be made or repaired with this cement. It is applied cold and if handled according to directions will make a joint that is absolutely waterproof. Put up in one, two and eight pound cans.

1 Pound Cans, Price each..... \$1.80
2 Pound Cans, Price each..... 3.60
8 Pound Cans, Price each..... 14.40

**FOR WATER-PROOF LEATHER BELTING
NEPTUNE BRAND
LIQUID FORM**

FIG. 1662

Neptune Cement not only possesses wonderful adhesive qualities but is absolutely unaffected by darkness or weather. It is furnished in liquid form ready for use, and is put up in air-tight tin cans, one pound of cement in each.

1 Pound Cans, Price each.... \$2.00

BELT PRESERVATIVE**ROYAL WORCESTER BRAND
SEMI-LIQUID FORM**

NO. 1663

This is a semi-liquid compound that penetrates and preserves the fibres of leather. It will keep belts in a pliable condition, prevent slippage, prolong life, enable belting to grip the pulleys firmly and to transmit power efficiently.

Is easily and quickly applied and is decidedly economical in use. Is absolutely free from substances injurious to leather. It will protect the laps and plies where the belts are used in damp places, providing the belts are given a thorough dressing once a month. Put up in gallon and half gallon pails.

Half-Gallon Pails, Price each..... \$1.00
Gallon Pails, Price each..... 2.00

OIL CUPS



A—FIG. 1684



B—FIG. 1685



C—FIG. 1686



D—FIG. 1687



K—FIG. 1688

FIG. 1689
N CLOSEDFIG. 1690
N OPEN

STYLE A

These cups are designed for use where space is limited. They set low, open easily, close automatically, are dust-proof and do not jar open or loose. Nickel-plated finish will be sent, unless otherwise specified. We furnish $\frac{1}{8}$ -inch pipe thread on No. 4 and $\frac{1}{4}$ -inch on No. 5, if desired.

STYLE B

Opened by raising cap as shown in illustration. The cap can be turned around, so oil-can is easily inserted in any direction. When cap is released they close automatically. Dust-proof and do not jar open or loose. All cups furnished nickel-plated, unless ordered in brass. We furnish $\frac{1}{8}$ -inch thread on Nos. 4, 5, and 7; $\frac{1}{4}$ or $\frac{1}{8}$ -inch on No. 6, and $\frac{1}{8}$ or $\frac{3}{8}$ -inch on No. 8 if desired.

STYLE C

This is a very neat, low-priced, practical oil cup, having a shoulder at the top edge to drive to when assembling. Nickel-plated finish always sent, unless polished brass is specified.

STYLE D

For oiling these cups are easily opened from any direction with spout of oil can. When can is withdrawn the cap drops instantly into place. Do not jar open or loose. Style and number should be given in ordering. We furnish $\frac{1}{4}$ -inch 32 thread on No. 2; $\frac{1}{8}$ -inch on Nos. 3, 4, 5 and 7; $\frac{1}{8}$ or $\frac{1}{4}$ -inch on No. 6, and $\frac{1}{8}$ or $\frac{3}{8}$ -inch on No. 8, if desired. Nickel-plated sent, unless otherwise specified.

STYLE K

This cup projects but little above the bearing, which is an advantage. The hexagon shoulder provides an easy and rapid means of assembling. It is self-closing and dust-proof.

STYLE N

Made with a spring friction fit between inner and outer part, furnishing a smooth-working, dust-proof cap which can be turned either way to open, but will not jar open.

SIZES AND PRICES

Style A						Style B							
Number	1	2	3	4	5	1	2	3	4	5	6	7	8
Diam. Stock Thd. inches.....	$\frac{1}{4}$	$\frac{1}{8}$	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{4}$	$\frac{1}{8}$	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{4}$	$\frac{1}{4}$
Thd.....	32	32	24	24	24	32	32	24	24	24	24	Pipe	Pipe
Diam., Hex., inches.....	$\frac{1}{4}$	$\frac{1}{8}$	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{3}{8}$	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{5}{8}$	$\frac{3}{4}$	$\frac{1}{2}$	$\frac{1}{2}$
Diam. Cap inches.....	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{5}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{3}{4}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$
Price, Nickel-Plated, per 100.....	\$7.00	9.50	10.70	12.50	16.00	7.00	9.50	10.70	12.50	16.00	22.00	30.00	38.00

STYLE D								STYLE N						
umber	1	2	3	4	5	6	7	8	0	1	2	3	4	5
iam. Stock Thd. inches	$\frac{1}{4}$	$\frac{5}{16}$	$\frac{3}{8}$	$\frac{7}{16}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{4}$	$\frac{1}{4}$	No. 10	$\frac{1}{4}$	$\frac{5}{16}$	$\frac{3}{8}$	$\frac{7}{16}$	$\frac{1}{2}$
th.	32	32	24	24	24	24	Pipe	Pipe	32	32	32	24	24	24
iam. Hex. inches	$\frac{1}{4}$	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{5}{8}$	$\frac{3}{4}$	$\frac{1}{2}$	$\frac{1}{2}$	..	..	..	..	..	..
iam. Cap, inches	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$1\frac{1}{8}$	$\frac{1}{2}$	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{5}{8}$
ptional Pipe Thd. inches . . . . .	..	..	..	..	..	..	..	..	..	..	..	..	..	..
rice, Nickel Plated, per 100	\$7.00	9.50	10.70	12.50	16.00	22.00	30.00	38.00	7.00	7.00	9.50	10.70	12.50	16.00

STYLE C								STYLE K					
Number	OC	1C	2C	3C	4C	5C	6C	20K	21K	22K	23K	24K	25K
Diam. Inch....	$\frac{1}{4}$	$\frac{1}{8}$	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{5}{8}$	...	...	...	...	...	...
Diam. hex., inch....	..	..	..	..	..	..	..	$\frac{1}{8}$	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{3}{4}$	$\frac{1}{2}$
Drive into hole, inch....	$\frac{1}{4}$	$\frac{1}{8}$	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{5}{8}$	...	...	...	...	...	...
Bread, inch....	..	..	..	..	..	..	..	291-32	$\frac{1}{8}$ -32	$\frac{3}{8}$ -24	$\frac{1}{8}$ Pipe	$\frac{1}{4}$ Pipe	$\frac{3}{8}$ Pipe
Price, Nickel-Plated per 100	\$4.00	5.00	6.25	7.50	8.75	10.00	12.00	4.00	4.70	5.30	6.00	7.50	10.50

PLEASE MENTION STYLE AND NUMBER IN ORDERING

EMPRESS GREASE CUPS**PLAIN COMPRESSION****BRASS AND STEEL**

FIG. 1691

Drawn from rolled sheet metal; are lighter and neater, compared with cast cups of the same capacity; no excess weight of metal where it is not needed; are very strong and rigid, in fact are practically indestructible. Special lug knurling on the cap affords an excellent grip for operating the cup.

SIZES AND PRICES

Number	000	00	0	1	2	3	4	5
Capacity.....ounces	$\frac{1}{4}$	$\frac{1}{2}$	$\frac{3}{4}$	1	2	$3\frac{1}{2}$	5	8
Inside Diameter.....inches	$\frac{3}{4}$	1	$1\frac{1}{4}$	$1\frac{1}{2}$	2	$2\frac{1}{2}$	3	$3\frac{1}{2}$
Size Shank Pipe Thread....."	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{4}$	$\frac{1}{4}$	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{3}{4}$
Price, Rough Steel Finish.....each	\$.40	\$.50	\$.65	\$.80	\$1.05	\$1.45	\$2.00	\$3.00
" Dull Brass Finish....."	.46	.56	.74	.96	1.28	1.76	3.00	4.80
" Blued Steel....."	.55	.65	.80	.95	1.25	1.75	2.50	3.80
" Polished Brass Finish....."	.58	.70	.90	1.15	1.50	2.15	3.50	5.20
" Nickel Plated Brass....."	.75	.82	1.06	1.36	1.80	2.60	4.10	6.20

RATCHET COMPRESSION**BRASS AND STEEL**

Originally designed for automobile use. Largely used for lubricating many other kinds of machinery where vibration is excessive. The cap is positively locked at every half turn. The spring plate may be pushed down and locked in the groove seen in the shank, allowing the cap to be backed off for filling. These cups are very strong and durable; only extreme abuse can put them out of commission.



FIG. 1692

SIZES AND PRICES

Number	000	00	0	1	2	3
Capacity.....ounces	$\frac{1}{4}$	$\frac{1}{2}$	$\frac{3}{4}$	1	2	$3\frac{1}{2}$
Inside Diameter.....inches	$\frac{3}{4}$	1	$1\frac{1}{4}$	$1\frac{1}{2}$	2	$2\frac{1}{2}$
Size of Thread....."	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{4}$	$\frac{1}{4}$	$\frac{3}{8}$	$\frac{1}{2}$
Price, Rough Steel.....each	\$.70	\$.80	\$.95	\$1.15	\$1.40	\$2.00
" Brass....."	.90	1.10	1.35	1.70	2.30	3.40
" Finished Brass....."	1.05	1.25	1.50	1.90	2.50	3.80
" Brass, Nickel-plated....."	1.20	1.40	1.70	2.15	2.80	4.00

Short pattern cups are same capacities, dimensions and prices as regular pattern ratchet cups and are made in both brass and steel. An extra charge is made for cups fitted with wing caps.

RATCHET COMPRESSION**BRASS AND STEEL—NO. 249**

FIG. 1693



FIG. 1694

The action of the No. 249 Ratchet Cup is quite clearly illustrated by the sectional cut shown. It will be seen that the method of locking the cap is very simple and effective and that there is nothing to get out of order. All the locking mechanism is inside the cup leaving nothing to catch dust and dirt. A very reliable, moderate priced cup, for general purposes.

SIZES AND PRICES

Number	000	00	0	1	2	3	4
Capacity (grease).....ounces	$\frac{1}{4}$	$\frac{1}{2}$	$\frac{3}{4}$	1	2	$3\frac{1}{2}$	7
Inside Diameter.....inches	$\frac{3}{4}$	1	$1\frac{1}{4}$	$1\frac{1}{2}$	2	$2\frac{1}{2}$	$3\frac{1}{2}$
Regular Pipe Thread....."	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{4}$	$\frac{1}{4}$	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{3}{4}$
Polished Brass Finish.....each	\$.90	\$1.07	\$1.33	\$1.66	\$2.15	\$3.19	\$4.19
Dull Brass Finish....."	.76	.90	1.14	1.43	1.88	2.71	4.19
Nickel Plated Brass....."	1.11	1.22	1.53	1.72	2.51	3.73	4.19
Rough Steel Finish....."	.69	.82	.99	1.18	1.52	2.27	3.69
Blued Steel Finish....."	.79	.97	1.14	1.33	1.72	2.57	3.69

Orders for brass cups will be filled with polished brass finish.
Orders for steel cups will be filled with rough steel finish.
Regular pipe thread always sent unless otherwise specified.

"REX" RATCHET COMPRESSION GREASE CUP**LEAKLESS**

A grease cup made especially for manufacturers of motor vehicles who require accessory equipment that will give no cause for complaints. It is strongly made with steel shank and nickel-plated brass cover; light weight, due to balanced metal distribution; has inside ratchet spring to prevent loss of cover and to hold it in position after being set. This inside spring keeps the grease stirred up and prevents solid matters from separating from the lubricant. There are no outside springs to collect dust and dirt. The body and cap threads are milled to fit perfectly throughout their whole length thus overcoming the greatest objection to the ordinary cup, the leakage of grease through poorly fitting threads.

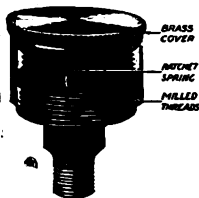


FIG. 5056

SIZES AND PRICES

Size	000	00	0	1
Capacity of Grease, oz.	$\frac{1}{4}$	$\frac{1}{2}$	$\frac{3}{4}$	$1\frac{1}{2}$
Body Diameter, inches	$\frac{1}{8}$	$1\frac{1}{4}$	$1\frac{1}{4}$	$1\frac{3}{8}$
Extreme Diameter, inches	$\frac{1}{8}$	$1\frac{1}{4}$	$1\frac{3}{8}$	$1\frac{11}{16}$
Extreme Length Open, inches	$1\frac{1}{8}$	$1\frac{1}{8}$	$1\frac{1}{8}$	$2\frac{1}{2}$
Pipe Thread of Shank, inches	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{4}$	$\frac{1}{4}$
List Price, Nickel-Plated	\$0.85	\$0.95	\$1.15	\$1.75

THE EASY FILLED GREASE CUP

The thin spring metal plunger, slightly concave, like a shallow saucer exerts a firm, uniform pressure against the sides of the barrel, making the cup dustproof, leakproof, grease-tight and oil-tight. Oil as well as grease may be applied with any required pressure (with the pressure of a grease gun). It insures reaching all dry or dirt-encrusted parts, procuring positive and thorough lubrication. You are sure that the grease or oil goes right into the bearing and not a particle on the outside of the cup. Easily and quickly filled as the metal cap is opened and put back each with one turn. Plunger and top fastened to the barrel; you cannot lose or mislay a part.

Nickel-plated. Capacity $\frac{1}{2}$ oz. grease; inside diameter $\frac{1}{8}$ inch; outside diameter $\frac{7}{8}$ inch; size shank pipe thread $\frac{1}{8}$ inch.
Price each..... \$0.75



FIG. 5016

"EMPRESS" SPRING COMPRESSION GREASE CUPS**BRASS AND STEEL**

Automatic type in which the grease is fed by spring pressure. A valve screw in the shank regulates the amount fed to the needs of the bearing. The handle can be adjusted on the threaded rod so as to cut off the feed when any desired quantity of grease has been fed. A lock in the handle prevents the handle from jarring around when the cup is used on vibrating machinery. For machinery where a highly finished grease cup is not necessary, steel cups can be used making a saving in cost.

SIZES AND PRICES

Number	00	0	1	2	3	4
Capacity..... ounces	$\frac{1}{2}$	1	$1\frac{1}{2}$	3	6	10
Inside Diameter..... inches	$\frac{1}{8}$	$1\frac{1}{4}$	$1\frac{1}{2}$	2	$2\frac{1}{2}$	$2\frac{3}{4}$
Extreme Outside Diameter..... "	$1\frac{1}{8}$	$1\frac{1}{4}$	$1\frac{1}{2}$	$2\frac{1}{4}$	$2\frac{1}{2}$	$3\frac{1}{8}$
Size Shank Pipe Thread..... "	$\frac{1}{8}$	$\frac{1}{4}$	$\frac{1}{4}$	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{1}{2}$
Price, Rough Steel..... each	\$1.30	\$1.50	\$1.75	\$2.00	\$2.75	\$3.60
" Polished Brass..... "	1.50	2.00	2.50	3.20	4.30	5.60
" Brass Nickel Plated..... "	1.75	2.25	2.80	3.60	5.00	6.75

"SAMSON" SCREW PLUNGER GREASE CUPS**CAST BRASS**

A well put up, substantial brass grease cup, which will stand any amount of hard usage; made of best steam metal, highly polished.

SIZES AND PRICES

Size Number	00	0	1	$1\frac{1}{2}$	2	$2\frac{1}{2}$	3	4
Cap. oz.	$\frac{1}{2}$	1	$1\frac{1}{2}$	$2\frac{1}{4}$	$3\frac{1}{4}$	$4\frac{3}{4}$	6	10
Inside Diam. in.	$\frac{1}{8}$	$1\frac{1}{4}$	$1\frac{1}{2}$	$1\frac{3}{4}$	2	$2\frac{1}{4}$	$2\frac{1}{2}$	3
Extreme Outside diam. inches	$1\frac{1}{8}$	$1\frac{1}{4}$	$1\frac{1}{2}$	$2\frac{1}{8}$	$2\frac{1}{2}$	$2\frac{3}{4}$	$3\frac{1}{8}$	$3\frac{3}{4}$
Height over all, inch. Plunger raised	4	$4\frac{1}{4}$	$5\frac{1}{2}$	6	$6\frac{3}{8}$	7	$7\frac{1}{2}$	$8\frac{3}{8}$
Pipe Thread of Shank, inches	$\frac{1}{8}$	$\frac{1}{4}$	$\frac{1}{4}$	$\frac{1}{4}$	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$
Price, Brass Finish, each	\$1.00	\$1.20	\$1.60	\$1.80	\$2.00	\$2.40	\$2.80	\$4.00
Price, Nickel-Plated, each	1.20	1.45	1.90	2.10	2.40	2.90	3.40	4.75



FIG. 1699

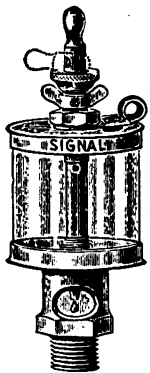


FIG. 1703

"SIGNAL" PATENT SIGHT FEED GLASS OILER**SIZES AND PRICES**

Numbers	0	1	1½	2	3	4	5	6
Capacity.....	5/8 oz.	1 oz.	1½ oz.	2½ oz.	¼ pt.	1/8 pt.	½ pt.	1 pt.
Outside diameter of glass, inches.....	1¼	1½	1¾	2	2¼	2½	3	3½
Height of glass, inches.....	1½	1¾	1¾	1¾	2¼	2¾	3	4
Size of shank, pipe thread, inches.....	¼	¼	¾	¾	¾	1½	1½	1½
Polished, each.....	\$3.00	\$3.25	\$3.50	\$3.75	\$4.25	\$5.25	\$7.25	\$9.25
Nickel plated, each.....	3.50	3.75	4.00	4.25	4.75	5.75	8.00	10.25

"TRIDENT" GAS ENGINE CYLINDER LUBRICATOR**SIZES AND PRICES**

Number	2	3	4	5	6	7	8
Capacity.....	2½ oz.	4 oz.	6 oz.	8 oz.	16 oz.	1½ pt.	1 qt.
Outside diameter of Body Glass, inches..	2	2¼	2½	3	3½	4	4½
Length of Glass, inches.....	1½	2½	2½	3	4	4½	5
Outside diam. and length Sight Glass, inch.	1¼x¾	1¼x¾	1¼x¾	1¼x¾	1¼x¾	1¼x¾	1¼x¾
Size of Shank, Pipe Thread, inches.....	¾	¾	¾	¾	¾	¾	¾
Polished, each.....	\$5.00	\$5.50	\$6.50	\$9.00	\$11.50	\$20.50	\$26.75
Nickel plated, each.....	5.50	6.00	7.00	9.75	12.25	22.50	28.75

FIG. 1705

**"DUKE" AIR COMPRESSOR LUBRICATOR****FOR AIR COMPRESSORS, GAS AND GASOLINE ENGINES**

The ½ pint and larger sizes are furnished with gauge glass as shown in illustration. The ¼ pint and 1/8 pint sizes have only the sight feed glass.

SIZES AND PRICES

	¼ Pint	1/8 Pint	½ Pint	1 Pint	1 Quart
Shank, inches...	¾	¾	½	½	½
Brass, Price ea...	\$6.00	\$7.25	\$9.50	\$12.50	\$16.00

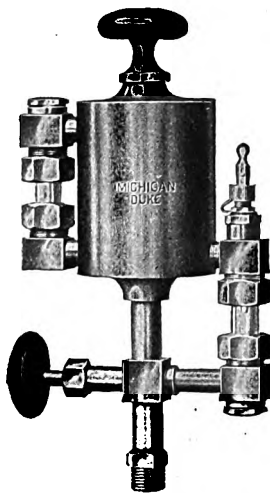


FIG. 1716

OIL CUP GLASSES AND CORKS

These glasses are clear, strong and uniform in size and are interchangeable with all styles of ordinary glass oil cups. They measure accurately as to size, and have ground ends. We can furnish urn shaped glasses on special order. Please specify in order whether cylindrical or urn shape is wanted.

SIZES AND PRICES

Diameter of Glass Inches	Height of Glass Inches	Price Glasses Each	Price Washers per Dozen	Diameter of Glasses Inches	Height of Glass Inches	Price Glasses Each	Price Washers Per Dozen
1	7/8	\$0.20	\$.30	2¼	2½	\$0.30	\$ 1.00
1½	1	.20	.40	2¾	2½	.40	1.00
1¾	1½	.20	.50	2½	2¾	.50	1.20
1½	1¾	.20	.60	2¾	2½	.60	1.20
1¾	1¾	.20	.60	3	3	.70	1.60
1¾	1½	.24	.70	3½	2¾	.70	1.70
1¾	1¾	.30	.80	3½	3½	.90	2.40
2	1¾	.30	.80	3½	4	1.00	2.40
2	1¾	.30	.80				



FIG. 1717

DETROIT ZERO SIGHT-FEED LUBRICATORS

FOR TRACTION ENGINES OR FOR ENGINES WORKING IN EXPOSED PLACES
ALSO USED ON STEAM PUMPS

The Detroit Zero Lubricators have a heating feature consisting of a cored passage through which there is constant circulation of steam, so that the oil cannot chill and become too stiff to feed properly.

Detroit Zero Lubricators are designed to feed freely in all temperatures. They are strong and sturdy and will stand up under severe usage.

SINGLE CONNECTION

The Single Connection is for use where a double connection lubricator cannot be installed.

IMPROVED DOUBLE CONNECTION

This style is intended to have both connections between the boiler and the throttle.

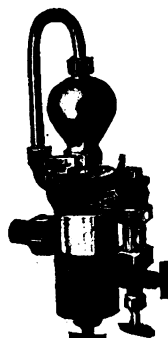


FIG. 1709
SINGLE CONNECTION

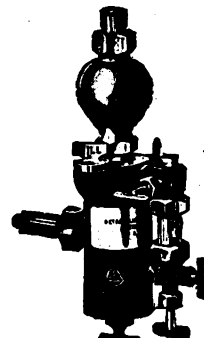


FIG. 1710
IMPROVED
DOUBLE CONNECTION

DOUBLE CONNECTION

The Double Connection Lubricators are very widely used on such traction and portable engines as have steam pipes suitable for a double connection lubricator. They are also extensively used on steam pumps, and on stationary engines, which are exposed more or less to the cold. They are furnished in two styles, A and C. On some engines the throttle valve is so located that one connection for the lubricator must be made above, and the other connection below it, while in others there is room enough to make both connections either above or below the throttle. The Style A should be attached with both connections between the boiler and the throttle. The Style C has spray feed feature and should take steam above the throttle and deliver oil below the throttle, either into steam pipe or top of steam chest. In ordering state how the attachment is to be made.

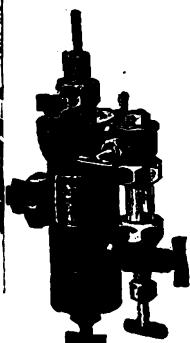


FIG. 1712
DOUBLE CONNECTION

SIZES AND PRICES

	Single Connection					Double and Improved Double Connection				
	1/4	1/2	3/4	1	2	1/4	1/2	3/4	1	2
Capacity, pints	1/2	1/2	1/2	1/2	1/2	3/8	3/8	3/8	1/2	1/2
Thd. inches	1/2	1/2	1/2	1/2	1/2	3/8	3/8	3/8	1/2	1/2
Body, Bronze Finish	..	..	..	..	..	..	..	..	..	..
Body, Finished Trimmings, each	..	..	..	..	..	..	..	..	..	..
Body, Nickel-Plated All Over, each	..	..	..	..	..	..	..	..	..	..
Sight-feed glasses, 3/4 x 2 1/8 inches	..	..	..	..	..	..	..	..	..	..

NEPTUNE SIGHT FEED GAS ENGINE LUBRICATORS

SIZES AND PRICES

Number	0	1	2	3	4	5	6
Capacity, ounces	1	1 1/2	2 1/2	4	5	10	18
Outside diameter of body, inches	1 1/2	1 3/4	2	2 1/4	2 1/2	3	3 1/2
Size of Shank, Pipe Thread, inches	3/8	3/8	1/2	1/2	1/2	1/2	3/4
Body, Nickel-Plated	\$3.50	\$4.00	\$5.00	\$6.00	\$8.00	\$10.00	\$12.00
Body, Nickel-plated	4.20	5.00	6.00	7.25	9.50	12.00	14.00

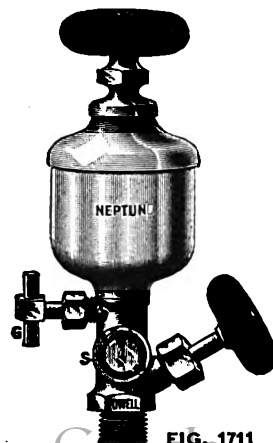


FIG. 1711

DETROIT IMPROVED STANDARD SIGHT FEED LUBRICATORS

SINGLE CONNECTION

The Detroit Improved Standard Single Connection occupies the same place among single connection lubricators that the double connection holds among double connection lubricators. It has replaced the Style C lubricator.

It is essentially the same as the double connection lubricator, except that it has an equalizing tube made necessary by the single connection.

The support arm is connected to the body at the center of gravity. On this account the connection holds the lubricator very firmly and vibration is reduced to a minimum.

SIZES AND PRICES

Capacity	pints	1/4	1/3	1/2	1	2
Size of Thread.....inches		1/2	1/2	1/2	1/2	1/2
Price, Finished.....each	
" Nickel-plated....."	

Size of glass, sight-feed, for 1/4, 1/3 and 1/2-pint, 3/4 x 2 1/8 inches; pint and quart sizes same as double connection lubricators.

Prices on application.

DOUBLE CONNECTION

The Detroit Improved Standard Double Connection Lubricator is a quality product throughout. In it are all the essentials of a perfect lubricator combined in a compact and well balanced design.

The support arm is in two parts. The part containing the globe valve is first screwed into the steam pipe and the lubricator is then coupled to it. This makes attachment easy and, on account of the globe valve, the lubricator can be removed at any time for any purpose without letting down steam. The heating passage from the upper sight-feed arm to the support arm passes directly through the body of the lubricator and, being always filled with steam, keeps the oil constantly warm and in a thoroughly liquid condition. This lubricator is well suited for feeding heavy oils.

SIZES AND PRICES

Capacity	pints	1/3	1/2	1	2	4	8
Size of Thread.....inches		1/2	1/2	1/2	1/2	3/4	3/4
Sight-Feed Glass....		5/8x2 1/8	3/4x3	3/4x3	3/4x3 1/4	3/4x3 1/4	3/4x3 1/4
Gauge Glass.....		5/8x2 1/8	5/8x3 1/4	5/8x4 3/8	5/8x4 3/8	3/4x6	3/4x7 3/4
Price, Finished.....each	
" Nickel-plated....."	

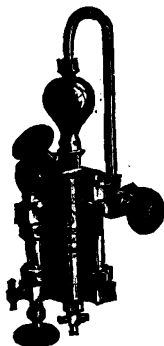


FIG. 1715

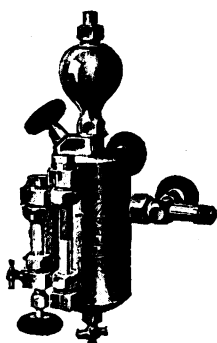


FIG. 1713
EXTERIOR

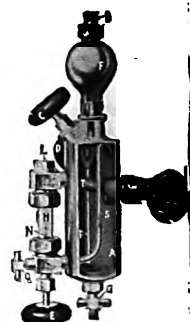


FIG. 1714

SECTIONAL

DETROIT "500" SIGHT FEED LUBRICATORS



FIG. 1706



FIG. 1707

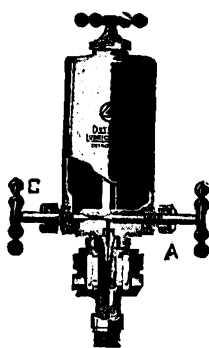


FIG. 1708

FOR ALL TYPES OF GAS ENGINES AND AIR COMPRESSORS

Easily operated and gives constant lubrication to the cylinder under every condition of service. The lubricator is made very substantially so as to withstand excessive pressures, vibration

and rough usage. It has bull's-eye sight feed and gauge glasses which are easily kept tight and will not break. The filler plug and barrel are provided with metal handles.

The lubricator is connected direct to the cylinder, using, desired, a short piece of pipe and elbow. No separate valve is used as the valve "B" in the support post cuts off the lubricator from the cylinder when it is desired to repack the glasses, clean the lubricator, etc.

The valve "C" controls the admission of oil to the oil passages and should be used to operate the lubricator, making it unnecessary to change the adjustment of valve "A", which need not be disturbed after once being properly regulated.

For use on the air end of stationary air compressors.

Attached to the air cylinder or installed on the air line. For service where the pressure varies, the "500" Lubricator, with ball check, is furnished. For service where the pressure is constant, as on the air line, the "500A" Lubricator, without a ball check, is furnished.

For service where the pressure is from 250 to 500 pounds the "500X" is furnished.

For service where the pressure exceeds 500 pounds the "500XX" is furnished.

FINISHED IN POLISHED BRASS OR NICKEL-PLATED

Sizes	1/3 Pt.	1/2 Pt.	1 Pt.	1 Qt.
"500" Pipe Thd on Arm..	1/2"	1/2"	1/2"	1/2"
"500A" " " " "	1/2"	1/2"	1/2"	1/2"
"500X" " " " "	1/2"	1/2"	1/2"	1/2"
"500XX" " " " "	.....	3/4"	3/4"	.....

PRICE LIST

No.....500 & 500A			500X		500XX	
Sizes	Brass	Nickel	Brass	Nickel	Brass	Nickel
1/3 pt.	\$8.40	\$9.15	\$11.00	\$11.90	.....	.....
1/2 pt.	8.80	9.55	11.90	12.60	\$21.90	\$22.60
1 pt.	12.25	13.00	15.40	16.15	25.40	26.15
1 qt.	17.05	18.00	20.00	20.80	.....	.....

"EMPRESS" STEEL FUNNEL GREASE CUP

FOR SHAFTING

Well made from heavy steel and is practically indestructible. When the cup is in position, the copper rod rests on the revolving shaft. Enough heat is generated by this contact to keep the grease flowing down the rod into the bearing. Does away with all drip pans and oil soaked floors. Its use is not confined to shafting, however, as these cups are much used whenever a grease cup can be installed in an upright position.

SIZES AND PRICES

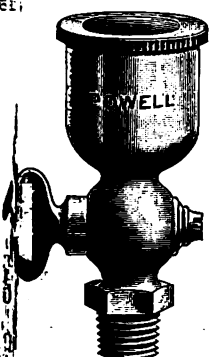
Number	1	3
Capacity (grease), oz.....	2½	5
Height over all, inches.....	3¼	4
Regular Pipe Thread, inches.....	¼	¼
Rough steel, each.....	\$0.80	\$1.00

Other sizes made if quantity is desired.

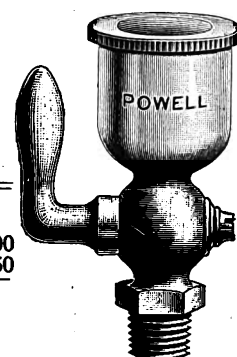
Orders will be filled with steel cups with regular pipe thread unless otherwise specified.



FIG. 1700

FIG. 1701
T HANDLE**BRASS OIL CUPS****SIZES AND PRICES**

Outside Diam. of Body, in....	1	1½	1¾	1½	1¾	2	2½	2½	3
Shank, Pipe Thd. in.....	¼	¼	¼	¾	¾	¾	½	½	¾
Price, T Handle, ea.....	\$1.00	\$1.25	\$1.50	\$2.00	\$2.50	\$3.00	\$3.75	\$4.50	\$6.00
Price, Lever Handle, ea.....	1.10	1.35	1.60	2.20	2.75	3.25	4.00	5.00	6.50

FIG. 1702
LEVER HANDLE**LOOSE PULLEY OILER**

ROUGH BRASS

Feeds only when pulley is in motion. Attach oiler to hub of pulley and regulate feed of oil by screw. The cross drilled hole in the screw is wide open when the screw driver slot points toward shank. For high speeds it is good practice to use two oilers for each pulley.

SIZES AND PRICES

Size, No.....	01	02	03	04	05
Diam. inches.....	1	1½	1½	1¾	2
Pipe Thd. in.....	½	¾	¾	¾	¾
Price, each.....	\$0.50	\$0.60	\$0.80	\$1.00	\$1.30



FIG. 1704

WEAVER VALVELESS BUCKET PUMP

FOR ENGINE OILS AND HEAVY GREASES

For handling engine oils and soft greases, this Bucket-Pump is the most convenient and practical equipment of this kind on the market. It eliminates all waste of lubricant and enables it to be handled with absolute convenience and accuracy.

One great advantage of the Weaver Bucket-Pump is the fact that its valveless construction permits lubricants to be handled in "three ways."

FIRST—The lubricant can be forced out of the Bucket and into the desired receptacle. **SECOND**—Grease or oils can be sucked out of the differential, transmission housing, etc. **THIRD**—The barrel or chamber of the Bucket may be sucked full of foreign lubricant and discharged again through the hose into a third receptacle without disturbing the contents of the Bucket.

The cylinder has a total capacity of one pound of grease or heavy oils. In handling light lubricating oils which are usually sold by liquid measurement, ten full strokes of the lever handle will discharge one quart.

The Weaver Bucket Pump is equipped with ⅝ inch Flexible Steel Hose which cannot be affected by the grease, as is the case with rubber hose.

The Bucket proper is made of heavy sheet iron and has a capacity of 25 pounds of grease. The cylinder is of 16-gauge brass tubing, two-inch diameter, containing a plunger which will not leak and is impervious to the action of grease and oils. Shipping weight, 25 lbs.

Price, each..... \$.....



FIG. 1735

FABCO BARREL PUMPS

Will handle lubricating oils, gasoline, distillate, kerosene, turpentine, shellac, varnish, bolting cement, vegetable oils, molasses, syrup, flavoring extracts. Can be attached in five minutes to the bung of any wood barrel or steel drum. Transferring from one container to another can be done at 3 to 5 gallons a minute. The discharge pipe is threaded for attaching the hose.

No. 22—Complete as shown with flexible metal suction tube to fit any depth of container. Construction is of high grade close grain gray iron; cylinder and valves of brass. Finish red enamel and highly polished brass. Shipping weight 16 pounds.

Price, each \$20.00

No. 21—Same construction as No. 22 except without drip pan, but with cut-off on outlet pipe. Especially adapted for fuel oils and volatile or viscous liquids. Cut-off prevents drip and evaporation. Shipping weight 16 pounds.

Price, each \$20.00

No. 10—Same as No. 21 except smaller capacity and without cut-off. 2 to 3 gallons per minute. Shipping weight 13 pounds.

Price, each \$17.50

A FEW FABCO FEATURES

1. The drip pan (patent applied for) saves the drops—all drip and overflow is strained and returned to the container.

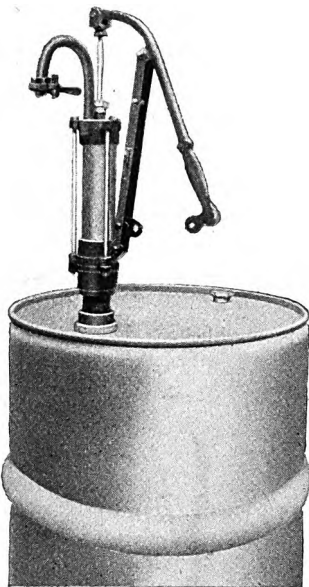
2. The speed with which heavy liquids can be pumped—3 to 5 gallons a minute.

3. The ease of attachment to any container, side or end bung—being provided with a taper nipple having $1\frac{1}{2}$ inch pipe thread.

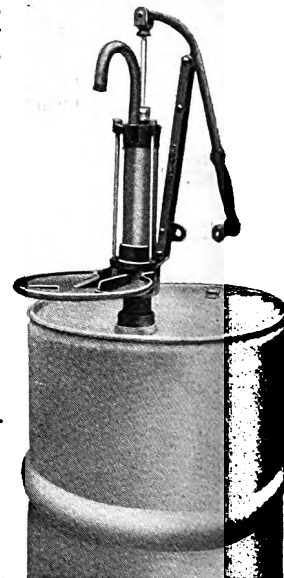
4. The handle is provided with lugs so that the pump can be locked—no unauthorized use.

5. The discharge pipe is threaded for use of hose in transferring.

6. A flexible suction tube is supplied to fit containers of any depth.



NO. 21—FIG. 5017



NO. 22—FIG. 5018

BOE GREASE AND OIL GUNS

AUTOMATIC AND REPEATER

Handles any gear greases or oils. Dispenses and accurately measures same by pound or by pint simply by operator opening a shut-off valve on the automatic, or by a turn of the crank on the repeater.

Five-inch indicating meter dial in cover is as plainly readable as the face of a clock and as accurate as any standard scale or measure. Passed by the State Weight and Measure Inspection.

Entire cover of either style gun can be opened almost instantly for refilling. Will not discharge more lubricant than shown by indicating dial. On the square with owner and customer alike.

Saves time and lubricant. Is simple and durable in construction. Is quick, clean and economical.

Can furnish either the Automatic or Repeater in following sizes:

No. 100 or 3—40 x 11½ inch steel tank, single chamber gun, capacity about 100 pounds grease or about 15 gallons oil. Shipping weight about 150 pounds.

Price..... \$75.00

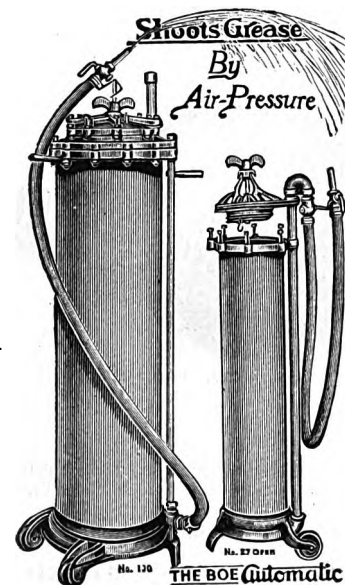


FIG. 5019

No. 50 or 2—36 x 8 inch, extra heavy steel tank gun. Capacity about 50 pounds. Shipping weight about 100 pounds.

Price..... \$60.00

No. 27 or 1—36 x 6 inch, steel tank gun. Capacity about 27 pounds. Shipping weight about 45 pounds.

Price..... \$40.00

Regular finish green and black. Shipments will be made with indicating dial for showing pounds unless ordered for handling oil by pints.

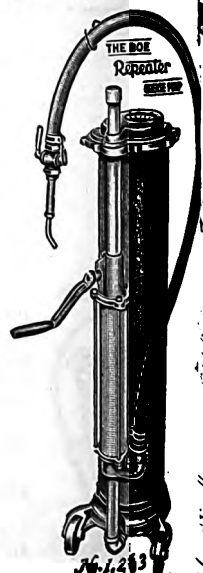


FIG. 5020

TOWNSEND GREASE GUN

This is an extra large grease gun for garage use. It is quick and strong, handles a large volume of grease, and is for use around shops for filling transmissions, differential housings, etc. To fill this gun, unscrew the back end, remove an inner shell which is the full size of the gun and fill the same from the grease can, replace shell in the gun and screw the cap on the end. The quadruple screw and crank handle enables the operator to discharge a pound of grease in fifteen seconds. Will handle any weight of grease. This is a high grade gun of large volume, and a great time saver.

PRICE LIST

Capacities.....	8 oz.	12 oz.	16 oz.
Price each.....	\$5.00	6.00	7.00

Packed in strong wood box with paddle for filling, and 5-inch spout with $\frac{1}{8}$ inch nozzle.

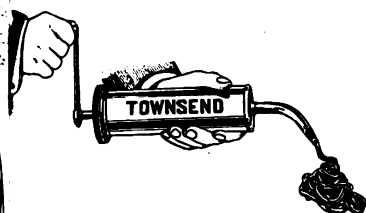


FIG. 1730

KELLOGG COMBINATION GREASE AND OIL GUN

MADE OF BRASS AND STEEL

A powerful rack and pinion movement gives the necessary leverage to handle heavy grease easily. With oil it is operated like an ordinary oil gun. special type of piston creates a powerful suction for filling, and insures complete and speedy delivery. Furnished with two spouts. Can be used with lightest oil or heaviest grease. Capacity 8 ounces.

Price each..... \$3.50

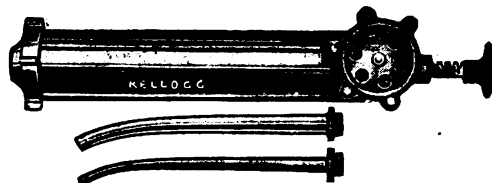


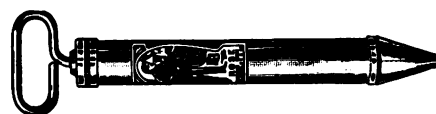
FIG. 1731

THE ROSE GREASE GUN

A SELF-LOADING GUN



SHOP GUN FIG. 5157



AUTO GUN FIG. 5158

SHOP GUN

Made from heavy steel, and cannot be put out of commission by hard knocks. Will suck up through the nozzle all kinds of light oils and some grades of hard grease. Fills easily with the hardest grease after you remove the nozzle. Can be used for cleaning transmissions and differentials, as it will inject and suck out gasoline and dirt.

AUTOMOBILE GUN

Made especially for individual use, just like the Shop Grease Gun only smaller to fit the auto tool box. Will not dent up and become useless from hard usage, and is not a tin whistle but a Real Steel Gun.

Fills by suction and will suck up through the nozzle all grades of light oils and some kinds of hard grease, but fills easily with the hardest grease after you remove the nozzle, which is easily detached and attached.

PRICE LIST

Style	Length Over all Inches	Outside Diameter, Inches	Will draw up Hard Grease one stroke, lbs.	Shipping Weight, Lbs.	Price Each
Auto Grease Gun	12½	1¼	¼	1¼	\$2.40
Shop Grease Gun	24½	1½	1¼	2½	5.50

MALLEABLE IRON OILERS

Malleable iron body, copper-plated spring brass bottom, bright steel straight spout.

SIZES AND PRICES

Nos.	1	2	3
Capacity, pints.....	$\frac{1}{8}$	$\frac{1}{4}$	$\frac{3}{8}$
Diameter bottom, inches.....	$3\frac{1}{8}$	$3\frac{1}{4}$	$3\frac{3}{8}$
Height of body, inches.....	3	3	3
Length of spout, inches.....	$3\frac{1}{8}$	$3\frac{1}{4}$	$3\frac{3}{8}$
Weight doz., lbs.....	$4\frac{3}{4}$	$5\frac{3}{4}$	7
Price per Dozen.....	\$3.60	\$4.00	\$4.40

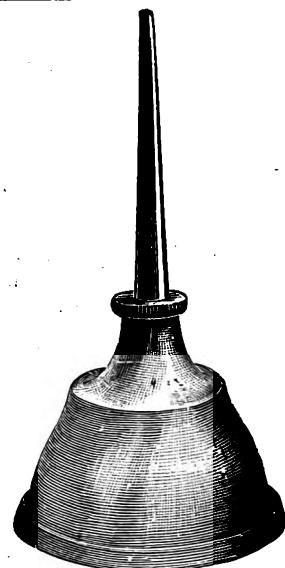


FIG. 1719

CHACE'S PATTERN OILERS

Seamless body with double seamed spring bottom, straight spout with coarse round thread screw.

SIZES AND PRICES

Nos.	00	0	1	2	3	4	5	6
Capacity, pints.....	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{4}$	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{3}{4}$	$\frac{1}{2}$
Diameter of bottom, inches.....	2	$2\frac{1}{4}$	$2\frac{3}{4}$	$2\frac{1}{4}$	$2\frac{3}{4}$	$4\frac{1}{8}$	$4\frac{1}{2}$	$4\frac{3}{4}$
Height of body, inches.....	$1\frac{3}{8}$	$1\frac{7}{8}$	$2\frac{1}{4}$	$2\frac{3}{4}$	$2\frac{7}{8}$	$3\frac{1}{8}$	$3\frac{1}{4}$	$3\frac{3}{4}$
Length of spout, inches.....	$2\frac{1}{8}$	$2\frac{1}{8}$	$2\frac{1}{8}$	$4\frac{1}{4}$	$4\frac{1}{4}$	5	5	5
Weight doz., lbs.....	$\frac{7}{8}$	1	$1\frac{1}{4}$	$2\frac{1}{4}$	3	4	$4\frac{1}{2}$	5
Quantity in a box, doz.....	1	1	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$
Zinc, price per dozen.....	\$1.00	\$1.25	\$1.50	\$2.00	\$2.25	\$2.75	\$3.50	\$4.50
Copper, price per dozen.....	.....	2.50	2.75	3.75	4.25	5.00	6.25	...

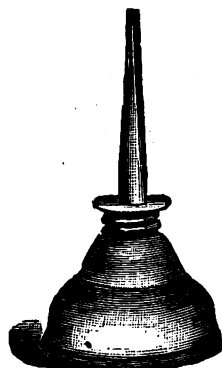


FIG. 1718

COPPERIZED STEEL OILERS

Seamless body stamped from cold rolled steel, coppered inside and out to prevent rust, reinforced tempered spring steel bottom, large mouth $1\frac{1}{2}$ inches in diameter, easily filled without use of funnel.

REGULAR PATTERN
SIZES AND PRICES

Nos.	12	13	13A	14AA	15A
Capacity, pints.....	$\frac{1}{4}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	1
Diameter bottom, inches.....	$2\frac{3}{4}$	$3\frac{3}{8}$	$3\frac{3}{8}$	$3\frac{3}{4}$	$4\frac{1}{4}$
Height of body, inches.....	$1\frac{7}{8}$	$2\frac{1}{8}$	$2\frac{1}{8}$	$2\frac{1}{4}$	$2\frac{3}{4}$
Length of spout, inches.....	$2\frac{1}{2}$	3	5	5	5
Weight doz., lbs.....	$2\frac{1}{2}$	$3\frac{1}{4}$	$3\frac{1}{2}$	4	$4\frac{1}{2}$
Price per dozen.....	\$4.50	\$5.50	\$6.00	\$8.00	\$9.75

MACHINISTS
SIZES AND PRICES

Nos.	14	14B	16
Capacity, pints.....	$\frac{1}{2}$	$\frac{1}{2}$	1
Diameter bottom, inches.....	$3\frac{3}{8}$	$3\frac{3}{4}$	$4\frac{1}{4}$
Height of body, inches.....	$1\frac{7}{8}$	$2\frac{1}{4}$	$2\frac{3}{4}$
Length of spout, inches.....	9	9	9
Weight doz., lbs.....	$3\frac{1}{4}$	$4\frac{1}{4}$	$4\frac{1}{2}$
Price per dozen.....	\$6.50	\$8.50	10.50

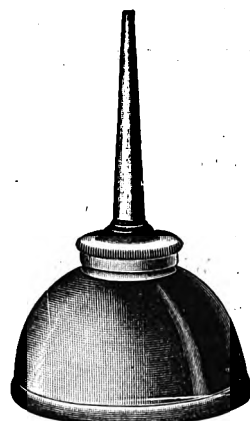


FIG. 1720
NOS. 12 TO 15A

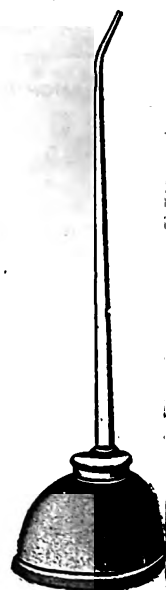


FIG. 1721
NOS. 14, 14B AND 16

RAILROAD OILERS

STEEL—FIG. 1722

Made of extra heavy steel, copper-plated inside and out so will not rust; have the collars attached to body of can and cap to spout without soldering or brazing, this makes practically solid joints; threads are machine cut, new style caps and collars.

SIZES AND PRICES

Nos.	10	11	111
Capacity, pints.....	1	2	4
Diameter of bottom, inches.....	3 $\frac{3}{8}$	4 $\frac{1}{8}$	5
Height of body, inches.....	5	6	8
Length of spout, inches.....	12	18	14
Weight doz., lbs.....	10	13	21 $\frac{1}{2}$
Price per dozen.....	\$14.00	\$18.00	\$20.00

COPPER PLATED ENGINEERS' FILLERS

Price per doz.

No. 19.	1 pint steel filler, 4 $\frac{1}{8}$ in. diameter, 3 $\frac{1}{2}$ in. high, screw top ...	\$14.00
No. 19A.	1 $\frac{1}{2}$ pint, 4 $\frac{3}{4}$ in. diameter, 4 in. high, screw top.....	17.00
No. 210.	1 quart, 5 in. diameter, 5 in. high, screw top.....	20.00
No. 211.	2 quart, 6 in. diameter, 6 in. high, screw top.....	24.00

BRASS ENGINEERS' FILLERS

Price Per Doz.

No. 170.	1 pint brass filler, 4 $\frac{1}{8}$ in. diameter, 3 $\frac{1}{2}$ in. high, screw top..	\$18.00
No. 190.	1 $\frac{1}{2}$ pint, 4 $\frac{3}{4}$ in. diameter, 4 in. high, screw top.....	22.00
No. 200.	1 quart, 5 in. diameter, 5 in. high, screw top.....	30.00
No. 201.	2 quart, 6 in. diameter, 6 in. high, screw top.....	34.00

COPPER PLATED STEEL ENGINEERS' SETS

WITH ROUND TRAYS

No. C. 30.	Five pieces, copper plated, including tray.	Price per set.....	\$5.00
No. C. 40.	Six pieces, copper plated, including tray.	Price per set.....	7.00

COPPER PLATED STEEL STEAMBOAT SETS

ROUND DOUBLE TRAYS

No. C. 70.	Five pieces copper plated, including tray,	Price per set.....	\$6.00
No. C. 80.	Six pieces, copper plated, including tray,	Price per set.....	9.00

NUGENT SHAFT OILER

With the Nugent Shaft Oiler accidents are impossible. No ladders needed; great saving in oil; great saving in time, and that which was a dangerous task has become a pleasure, and consequently the shafting will be oiled regularly, friction reduced, coal, repairs and money saved. The operator controls the amount of oil used. He may deliver a drop or a spoonful.

Pipe, Pump, Can and Nozzle.....	\$7.50
Tubing, Extra per foot.....	.20

Send distance from floor to shaft.



FIG. 1723

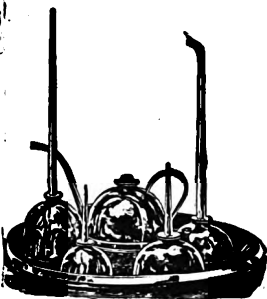


FIG. 1724



FIG. 1725

AUTOMOBILE PUMP OILERS

COPPERIZED STEEL

The 800 Series is made of 20 gauge Cold Rolled Steel, heavily Copper Plated and Lacquered. The body is drawn seamless in one piece. Oiler is designed for Automobiles, Stationary Engines, Power Boats, etc. It is equipped with a special Noera pump and the delivery of oil can be regulated by the distance of the stroke of the plunger. The 900 Series is made of 20 gauge Brass. Connections are all made from solid brass rod and have machine cut threads. Spout connection is made through special union which allows the adjustment of the spout to any position. All spouts are interchangeable. Oiler is equipped with a strainer to prevent clogging of the valves and spouts.



FIG. 1726

SIZES AND PRICES

MADE OF 20 GAUGE STEEL

MADE OF 20 GAUGE BRASS

Pint	Diameter, Inches	Nozzle, Inches	No.	Price, Per Doz.	No.	Price, Per Doz.
1/2	3 3/4	3	800	\$23.00	900	\$28.50
1/2	3 3/4	5	801	23.50	901	29.00
1/2	3 3/4	9	802	24.00	902	29.50
1	4 1/4	3	802 1/2	24.75	902 1/2	31.25
1	4 1/4	5	803	25.25	903	31.75
1	4 1/4	9	804	25.75	904	32.00

COPPER PLATED STEEL PUMP OILERS

Seamless steel cup bottom. Fewer soldered joints. Valves and Pump can be inspected. Pump inside, out of the way. Threads standard size so nozzles can be changed to other lengths. Finest and most accurate mechanism on the market.

No. 1000.	1 pint, 3 3/8-inch diameter, 9-inch nozzle.....	\$30.00
No. 2000.	1 1/2 pint, 3 3/4-inch diameter, 12-inch nozzle.....	40.00
No. 3000.	1 quart, 4 1/8-inch diameter, 15-inch nozzle.....	50.00



FIG. 1727

DONNELLEY'S POCKET OIL FLASK

CANNOT LEAK—SAVES 60 PER CENT OF YOUR OIL

Lasts much longer than old style oilers. No time consumed in opening and closing. Simply press the spring and the oil will flow. Note convenience in shape—it fits the pocket.

Price, per dozen..... \$9.00



FIG. 1729

COMBINATION MEASURES AND FUNNELS

EXTRA HEAVY WEIGHT

SIZES AND PRICES

POLISHED TIN

HEAVILY COPPER PLATED

Size	Diam. Bot.	Total Height	Diam. Spout	No.	Each	No.	Each
1/2 Pt.	2 3/4 in. x	4 3/8 in.	5/16 in.	1/2	\$.50	2 1/2	\$0.65
1 Pt.	3 1/2 in. x	5 3/4 in.	3/8 in.	1 1/2	.55	5	.80
1 Qt.	4 1/8 in. x	7 3/4 in.	1/2 in.	1	.60	10	1.00
2 Qt.	5 3/8 in. x	9 3/4 in.	1/2 in.	2	.85	20	1.35
4 Qt.	6 1/2 in. x	12 3/8 in.	1 1/8 in.	4	1.10	40	1.80



FIG. 1728

THE WHITE STAR OIL FILTER

ROUND TYPE

An inexpensive device of high efficiency for reclaiming used oil from machinery bearings, so that it may be fed again to the rubbing surfaces, and thus be used over and over, until actually worn out in the work of lubrication.

The White Star Filter removes from used oil all dirt, grit and other impurities and takes out all entrained water. When provided with a White Star Demulsifier it will also reclaim emulsified oil.

Usually more than half, and often from 75 to 90 per cent the oil fed to bearings passes through and escapes with the dry drips, going entirely to waste unless a White Star Filter is provided for reclaiming the good oil from the water and dirty residue.

In any power plant, small or large, the oil bill is an important item of expense. In even the smallest plant, therefore, reduction of 50 per cent or more in this item is an economy in no mean proportions; in the larger plants it amounts to high savings in dollars of monthly and annual savings.

The White Star is a revelation to the engineer accustomed to the old style oil filters with beds of bonedust, cotton waste, etc., which the oil has to penetrate. These filters are continually clogging and the cleaning of them is such a disagreeable task that it is put off as long as possible, to the serious detriment of operation. The White Star Filter can be cleaned in less than ten minutes without soiling the hands and without interrupting its operation.

The separation of water from the oil is effected by gravity, with or without the use of heat. The filtering is done through specially prepared, evenly woven cloth, which is easily removed for cleaning, and may be renewed any time at slight expense. An extra cloth is furnished with each filter. For small plants where a continuous oiling system is not contemplated and delivery of oil is made to filter by hand. Capacities given are very conservative and in every instance White Star Filters can be depended on to handle more oil than shown in table.

SIZES AND PRICES

No.	Filtering Cap. Gals. per 24 hrs.	Capacities, Gals.			Dimensions		List Price Each
		Pure Oil	Dirty Oil	Water	Diameter, Inches	Total Height Inches	
2	40	7½	5½	5	16	34	\$ 52.50
4	70	9½	7½	6½	18	37	75.00
5	100	12	10	9	20	38	90.00
7	150	15	13	12	22	40	112.50
10	175	19	17	16	24	44	127.50
12	200	25	18	20	26	47	150.00



FIG. 1736

SAFETY GALVANIZED OILY WASTE CANS

The only safe receptacle for Oily Waste and a positive safeguard against spontaneous combustion. A necessity to every modern Auto Garage.

This cut shows the patented self-closing Spring Cover, which always keeps cover closed and never falls out, no rivets or solder to break off and become loose. By the new method of construction, there being no solder used, it will stand the hottest fire without falling apart.

SIZES AND PRICES

Number.....	1	2	3	4	5	6
Capacity, inches.....	12	13½	15	17½	18	24
Height, inches.....	15	17½	24½	27½	28½	38½
Price each.....	\$3.40	4.50	6.50	9.40	15.20	23.90

Nos. 5 and 6 are extra heavy.



FIG. 1737



FIG. 1738



FIG. 1739

GALVANIZED PAILS

STANDARD

Flaring pattern, galvanized sheet steel, wire rimmed top, riveted ears, heavy wire bail.

SIZE AND PRICES

Number.....	82	102	122	142	162
Nominal capacity, quarts...	8	10	12	14	16
Size, inches.....	9¾ x 8½	10½ x 8¾	11 x 10	11½ x 10¼	11½ x 10¾
Ap. wt. doz. lbs.....	20	25	26	29	31
Price each.....	\$.65	.75	.85	1.00	1.15

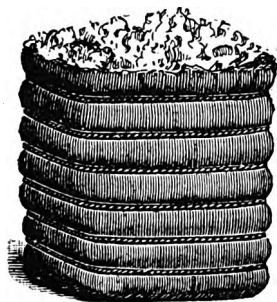


FIG. 1740

COTTON WASTE

XXX WHITE

This is a pure teased cop waste from heavy yarns. Long threads. Free from any woven material.

NO. 1 WHITE

Long threads. Largely composed of cop waste with some desicated canvas. Made from new materials only.

NO. 2 WHITE

Same as No. 1 except that threads are slightly shorter.

"A" COLORED

Made from colored yarns. Long threads.

"B" COLORED

A good soft material. Threads fairly long.

WOOL JOURNAL

Sixty per cent pure wool, balance cotton and jute yarns. Complies with railroad specification.

PRICE LIST

	XXX White	No. 1 White	No. 2 White	"A" Colored	"B" Colored	Wool Journal
	Price per Pound					
10 lb. Bales.....	\$.34	\$.31	\$.29	\$.29	\$.28	\$.28
50 lb. Bales.....	.27	.24	.23	.23	.22	.22
100 lb. Bales.....	.26	.23	.22	.22	.20	.20

SANITARY WIPING RAGS

All clean rags of good size. These rags are thoroughly cleaned, sterilized and sun-dried and can be satisfactorily used in place of waste. In many respects they are superior to waste for cleaning and polishing. Put up in 50 pound bales.

No. 1 Grade, Special, All White, Price per pound..... \$.25

No. 2 Grade, Mixed, White and Colored, Price per pound..... .20

SUGAR SACKS

As it is impossible to obtain uniformity of shape, size and quality of No. 1 Special Rags and No. 2 Mixed Rags, "Sugar Sack" Cloths will be found very serviceable where uniformity of size and grade is desired. Sugar Sack Cloths can be rinsed in gasoline several times before discarding and therefore prove economical.

Price, each..... \$.25



FIG. 1741



FIGS. 1742 AND 1743

THREE-IN-ONE OIL

Three-In-One Oil can be used to advantage in any number of places. Will not gum or sticky. Keeps steel and nickel from rusting, polishes woodwork. It is an excellent lubric for magnetos, bicycles and electric horns. Will prevent tools from rusting. It is perfect use on oil stones.

PRICES

Small Size Bottles, capacity about 1 oz.	Price each.....	\$.15
Large Size Bottles, capacity about 3 oz.	Price each.....	.30
Factory Size, capacity about 8 oz.	Price each.....	.60
Handy Cans capacity about 2 1/2 oz.	Price each.....	.30

NEATSFOOT OIL

A specially prepared compound of pure Neatsfoot Oil. Recommended for use on brake linings and clutches. Can be used freely as it contains nothing injurious.

1 Pint Cans.....	Price each	\$.60
1 Quart Cans.....	Price each	1.00
1 Gal. Cans.....	Price each	3.20



FIG. 1744

LARD OIL

Extra High Grade, Winter Strained.

For all general purposes, contains no acids, will not gum or corrode or turn rancid. Can be used without danger on the finest of mechanisms.

1 Gallon Cans, price per gallon.....	\$2.
5 Gallon Cans, price per gallon.....	1.
Barrels,..... price per gallon.....	1.

LINSEED OIL

	Raw	Boiled
1 Gal. Cans.....
2, 5-Gal. Cans in Cases.....
50 Gals. in Barrels.....

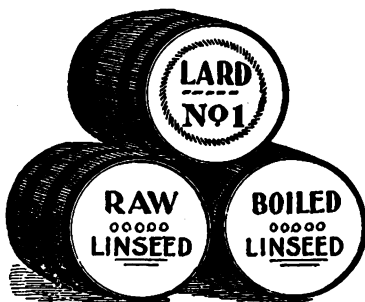


FIG. 1745

LUBRICATING OILS AND GREASES

We are now prepared to supply from our stock the following grades of oils which we guarantee to be strictly first class lubricants. They are carefully prepared and filtered, are free from animal or vegetable acids and are especially prepared for our use.

	CYLINDER OIL		DRILL OIL		MACHINE OIL
	Air	Steam	Air	Steam	
Price per Gal., Cases.....
Price per Gal., Barrels.....

SPECIAL GAS ENGINE OIL

Made up for Gasolene Engine use. Feeds freely. Will not gum, carbonize or dirty the plugs.

Price per gal., cases.....

Price per gal., barrels.....

CRANK CASE OIL

For Air Compressors.

Price per gal., cases.....

Price per gal., barrels.....

RED ENGINE OIL

A genuine mineral oil of heavy body. It will not volatilize and has a strong cold test. It is cheap and economical.

Price per gal., cases.....

Price per gal., barrels.....

DYNAMO OIL

A highly filtered mineral oil, which will keep bearings always cool and will not gum. It is very economical, as the same oil can be used repeatedly.

Price per gal., cases.....

Price per gal., barrels.....

KEARSARGE

This is an oil less injurious to rubber than any other oil on the market. Especially adapted for use with any machinery where the oil is likely to come in contact with rubber.

Price per gal., cases.....

Price per gal., barrels.....

ALBANY GREASE

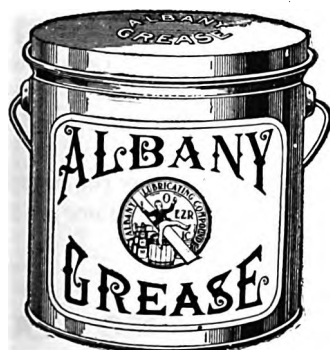


FIG. 1747

This Grease will not drip nor gum. Prevents hot boxes and does not freeze. All grades and numbers are the same quality, the difference being in the consistency, to make them suitable for various purposes and climates.

NO. 0

Very soft. For use in extreme cold weather and on exposed journals.

NO. 1

Harder than No. 0. For use on ordinary journals in cold weather, or on very cold or slow running journals, also elevator shafts.

NO. 2

Harder than No. 1. The grade ordinarily used in moderate warm weather and general shafting.

NO. 3

Adapted to the use of all stationary, marine and tug-boat engines; also shafting in warm weather, dynamos, general electrical and high-speed machinery.

NO. X

The No. X is a grade of extra hardness, which will lubricate journals with entire satisfaction, when no oil or lubricant of any other kind would work.

NO. XX

A grade of extra hardness and made to stand a higher degree of melting point than the X Grade.

NO. XXX

A grade made for unusual conditions of circumstances. Very hard, and will stand a higher degree of melting point than the XX grade.

PRICE LIST

1 pound cans	Each	\$0.50
In cans containing 5, 10, 25 and 50 lbs., per pound.....		.44
In kegs containing about 125 lbs., per pound.....		.26
In half-barrels containing about 200 lbs., per pound.....		.24
In barrels containing about 400 lbs., per pound.....		.22

ECONOMY GRINDING AND CUTTING LUBRICANTS

GRINDING



FIG. 1748

This is a solidified compound of pure oils and is quickly and easily soluble in water, producing the most efficient and economical lubricating fluid for use on cylindrical, internal, surface, tool and cutter, drill, cam and valve, piston ring, chucking, knife saw, and in fact on any kind of grinding machines.

DIRECTIONS FOR MIXING

Place 5 pounds of the lubricant in 20 gallons of water and stir until the lubricant is thoroughly dissolved. Then fill tank or machine about seven-eighths full of this solution, and it is ready for use.

PRICES

Barrels, about 450 pounds, each, Price per Pound.....

Half-Barrels, about 225 pounds each, Price per Pound....

CUTTING

This is a Highly Concentrated Solidified Oil Emulsion; thoroughly and permanently soluble and by simply mixing it with water (which is easily and quickly done) you obtain a milky-white cutting fluid of extraordinary lubricating and cooling power and minimum cost, for:

**THREADING—TAPPING—MILLING—DRILLING—TURNING—
DRAWING—PUNCHING—PLANING AND SAWING ALL
KINDS OF METAL**

Lubricates and cools edges of tools, making them cut faster and smoother and wear longer by requiring less frequent sharpening. Prevents gumming, rust or discoloration. Produces a highly polished finish. Works and flows like oil and does not clog pipes or drip-cans. Has a pleasant odor and is cleaner and more agreeable to use than oil. Keeps the hands in good condition. Lessens fire risk as it is fire-proof. Costs only from one to seven cents per gallon when mixed with water ready for use, according to the kinds of work to be performed. Full directions for mixing and using with every shipment.

DIRECTIONS FOR MIXING

Take 5 pounds of the lubricant and to this add water gradually to the amount of one gallon, and stir continually until the lubricant is completely dissolved and entirely free from lumps.

For use on automatic machines and turret lathes, add equal parts of stock solution and water.

For pipe threading, add one-half the quantity of water to that of stock solution.

For tapping, bolt threading, etc., add three to four times more water to that of stock solution.

For all drilling, to one part stock solution, add from ten to twelve parts water.

For all milling, add four to five parts of water to one part of stock solution.

The secret of obtaining the very best results from the use of Economy Cutting Lubricant is to have a good generous flow of the solution applied directly to the tools where the cutting is done.

PRICES

Barrels, about 450 pounds each, Price per Pound.....

Half-Barrels, about 225 pounds each, Price per Pound....

WHITE LEAD



FIG. 1750

STRICTLY PURE—DRY AND GROUND IN OIL

White Lead put up in 1, 2 and 5 lb. Cans, and 12½, 25, 50 and 100 lb. Kegs

DUTCH BOY



FIG. 1751

RED LEAD



FIG. 1752

STRICTLY PURE—DRY

Red Lead put up in 12½ and 25 lb. Kegs

LOWEST MARKET PRICES ON APPLICATION.

SMOOTH-ON IRON CEMENT



FIG. 1767

Smooth-On Iron Cements are chemically prepared iron compounds made and sold in a powder form and used by mixing with water to the consistency of stiff putty. When in this state they must be applied immediately because the metallizing action of these cements is rapid, acting without heat, and in a few minutes will get too stiff to work. In a few hours they will metallize as hard as iron. These cements are made for a number of different purposes as follows:

**IRON CEMENTS NO. 1 & NO. 2
IN BLUE LABELED CANS**

No. 1 is quick hardening. No. 2 is slow hardening and hydraulic. These cements are chemical iron cements, prepared and sold in powder form, for repairing leaks or breaks in castings and for making connections in steam or hydraulic work. They withstand fire, water, steam or oil and very high pressures. Applied as a paste or putty. Must be applied to cold metal. Expansion and contraction when hard the same as cast iron.

**ELASTIC CEMENT NO. 3
IN GRAY LABELED CANS**

This is an iron cement, prepared and sold in paste form for use on all seams of boilers or tanks, to stop leaks, also for boiler patching and for screw-thread joints. Also for repairing very fine cracks. This cement is hardened by heat. Applied as a paint, paste or putty. May be applied to hot or cold metal. Expansion and contraction when hard, the same as cast iron.

**CASTING CEMENT NO. 4
IN YELLOW LABELED CANS**

This is a chemical iron cement for repairing blemishes, blow holes or defects in iron or steel castings, having the same color and appearance. Made in two grades. Prepared and sold in powder form. Used by foundrymen. Applied as a putty.

**CALKING CEMENT NO. 5
IN RED LABELED CANS**

For plumbers, in powder form in two strengths—regular and special—regular for soil pipe and greenhouse work. Special for water and gas main joints and for high pressure.

**PUTTY CEMENT NO. 6
IN WHITE LABELED CANS**

A metallic putty cement for use on ships' sides, iron, steel or wood construction work, metal skylights, vault lights, etc. Prepared in putty form ready for use, in air tight cans. Applied with a trowel or putty knife and is very easy to work.

PRICE LIST SMOOTH-ON CEMENT

Iron Cement Nos. 1 and 2 in 1, 5, 10 and 25 lb. tins, Price per lb.....	\$0.50
Elastic Cement No. 3 in 1, 5, 10 and 25 lb. tins, Price per lb.....	.50
Casting Cement No. 4, Grades A and B, in 1, 5, 10 and 25 lb. tins, Price per lb.....	.50
Calking Cement No. 5 in 1, 5, 10 and 25 lb. tins, Price per lb.....	.50
Putty Cement No. 6 in 1, 5 and 10 lb. tins, Price per lb.....	.50

SMOOTH-ON MOTOR REPAIR PACKAGES

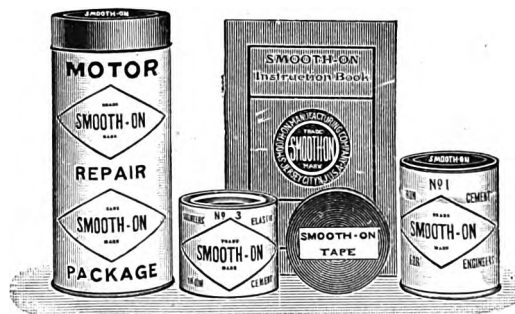


FIG. 1768

Smooth-On Repair Package in the automobile, garage, shop, home, etc., is insurance against long and expensive delays by unforeseen accidents, as with it repairs are easily and quickly made. It is a chemically prepared iron cement, made in powder and paste form. Withstands fire, water, gasoline, steam or oil, as it expands and contracts with the iron to which it is applied. The Motor Repair Package is a compact package of repairing cements, which enables you to make permanent repairs on water jackets, engines, valves, tanks, screw-thread joints, pumps, pipes, etc.

This outfit consists of 1 pound can No. 1 Smooth-On Cement, 1 pound can elastic Smooth-On Cement, 1 roll Smooth-On Tape and 1 complete instruction book. Price each.....	\$1.25
1 lb. Can No. 1 Cement for cracks wider than $\frac{1}{4}$ inch, Price each.....	.50
1 lb. Can Elastic Cement for fine cracks, Price each.....	.50

DIXON'S GRAPHITE LUBRICANTS**FLAKE GRAPHITE**

Dixon's Flake Graphite has many valuable applications as a lubricant for cylinders, valves and bearings, either alone or mixed with oils and greases. It is also valuable to steam engineers and mechanics for coating gaskets and packing, for pipe fitting, etc.

Dixon's Ticonderoga Flake Graphite is prepared in the coarser (or No. 1) flake and the finer (or No. 2) size. Users of Dixon's Graphite will do well to keep both kinds on hand, as each has special advantages.

If the finely ground (No. 2) graphite is desired, so specify in the order. Price the same for Nos. 1 and 2. Not for Automobile use.



FIG. 1753

PRICE LIST

Trade No.	Description of Packages	Price
631	½-pound Paper Cans.....per package	\$0.50
632	1 " Paper Cans.....	.90
633	5 " Tin Cans, Screw-top.....	3.75
634	10 " Tin Cans, Screw-top.....	6.90

GRAPHITE PIPE-JOINT COMPOUND

Invaluable for all steam, gas and water piping, and equally useful for smearing gaskets on flange joints of meters, traps, and for bolts, screws, etc.

Dixon's Graphite Pipe Joint Compound is not a cement which hardens, but rather a true lubricant for the thread of pipes, bolts, nuts, turnbuckles, etc., making them easy to screw up and allowing them to be taken apart without damage or trouble. Also valuable on flanges, gaskets, boiler tube caps, gas retort doors, etc.

Joints made up with this material can never rust, corrode, or stick, but may always be separated without difficulty after any length of time. Dixon's Graphite Pipe Joint Compound is very much superior to red or white lead and is 3½ times as bulky.

PRICE LIST

Trade Nos.	Description of Packages	Price Each
628	¼ lb. tubes.....	\$0.60
693	1 lb. cans.....	.60
694	5 lb. cans.....	2.50
695	10 lb. cans.....	4.70



FIG. 1754

GRAPHITE CUP GREASES—NOS. 3 AND 5

FIG. 1755

Cup greases containing fine flake graphite, reduce friction to a minimum. Use No. 3, except in hot climates where No. 5 is better. For all grease cups, wheel spindles, etc. By using these high grade graphite greases the bearings soon acquire the well-known graphite polish that eliminates friction and causes easy running.

	Price Each
1 -lb. Tin Cans.....	\$0.70
5 -lb. Tin Pails.....	3.15
10-lb. Tin Pails.....	6.00

MOTOR GRAPHITE

FIG. 5021

The purest and most carefully selected grade of flake graphite, ground extremely fine. Its function is to eliminate friction and wear of parts and to increase power. Use it in cylinders, on chains, springs, tires, wheel rims, bearings, and wherever friction occurs.

½-lb. Tin Cans. Price each... \$0.75

GRAPHITE HEAT-RESISTING GREASE—NO. 676

FIG. 1757

This is the best grease we know of for universal joints, water pump cups, overhead valve cups and clutch thrust collars. It positively will not melt and run out. This grease should not be used on gears.

	Price Each
1-lb. Tin Cans.....	\$0.70
5-lb. Tin Pails.....	3.15

GRAPHITE TRANSMISSION AND DIFFERENTIAL GREASE NO. 677

FIG. 1758

A graphited grease of just the right consistency for all transmissions and differential gears, except those intended to be lubricated with light oil. It is the grease the "Speed Kings" use. There is nothing like it on the market. We stand behind this grease with our strongest recommendation.

	Price Each
1-lb. Tin Cans.....	\$0.70
5-lb. Tin Pails.....	3.15
10-lb. Tin Pails.....	6.00

DIXON'S GRAPHITE LUBRICANTS

WATERPROOF GREASE

A special graphite grease of a dense consistency, suitable for general heavy service, with slow speeds and heavy pressures. It is unaffected by fresh, salt or alkaline waters. Recommended for hydraulic rams, elevator plungers, pump plungers, for gears and heavy exposed machinery, wire rope, cold roll necks and crushers of pulp and paper mill machinery.

	Per Pound
50-lb. Kegs.....	\$0.32
100-lb. Kegs.....	.30
400-lb. Bbl.....	.28

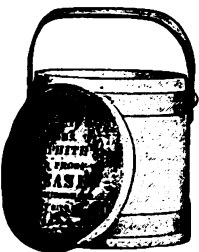


FIG. 5022

GRAPHITE NON-LEAK GREASE

NO. 680

Many differentials permit the lubricant to work out on the brakes and wheels. No. 680 will cure this trouble for it does not work out of the housing. Try it if your rear axle leaks. This special grease should be used only when No. 677 will not stay in the differential; it is not intended for transmission.

Price Each

2½-lb. Tin Cans.....	\$1.75
5 -lb. Tin Pails.....	3.15
10 -lb. Tin Pails.....	6.00



FIG. 1763

PIONEER BOILER GRAPHITE

A specially prepared Flake Graphite for use in the boiler. It prevents scale from forming to the tubes and burning fast. Reduces cost of cleaning, reduces fuel consumption and improves operation of pumps. Boilers of 100 H. P. use two-fifths of a pint per 12 hours.

Per Pound

100-lb. Kegs.....	\$.26
400-lb. Kegs.....	.24



FIG. 5159

PRUSSIAN BLUE

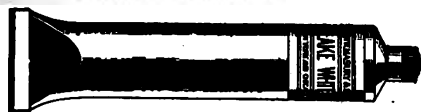


FIG. 1760

Is made from the highest quality imported Prussian Blue, ground in pure linseed oil put up expressly for use by mechanics fitting bearings or to show wear in old bearings.

Four ounce Tubes, Price, per dozen..... \$7.20



FIG. 1764

ORANGE SHELLAC

A high grade Orange Shellac for gaskets, coatings, rims, etc.

	Bottles			Cans	
	½ Pt.	1 Pt.	1 Qt.	½ Gal.	1 Gal.
Price each.	\$0.50	.95	1.75	3.30	6.00

BLACK ENGINE ENAMEL

Gloss Black, Dull Black, Auto Gray. Prepared especially for automobile cylinders and places where the hot oils frequently splash.

	Price Each
½ Pt. Cans.....	\$0.65
1 Pt. Cans.....	1.15
1 Qt. Cans.....	1.65



FIG. 1761

BRILLIANTSHINE METAL POLISH

BENNETT'S

For cleaning silver and metal ware.

Size cans, qts...	¼	½	1	2	4
Doz. in case.....	3	2	1	½	¼
Wt. per doz. lbs..	8	14	24	42	34
Price, per dozen.	\$2.00	3.50	6.50	12.50	21.00



FIG. 1765

LEPAGE'S LIQUID GLUE

PATENT TOP CANS



FIG. 1769

Size Cans	Pints				Quart	Gallons	
	$\frac{1}{8}$	$\frac{1}{4}$	$\frac{1}{2}$	1	1	$\frac{1}{2}$	1
Price doz.....	\$1.80	2.80	4.50	7.00	11.25	21.00	40.00

IMPERIAL LIQUID GLUE

IN SEAL-TIGHT CANS

Price doz.....	\$2.00	2.80	4.50	7.00	11.25	21.00	40.00
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DRY GLUE

IN BULK

Best Sheet Glue, Price per lb.....
Best White Glue, Price per lb.....

GLUE POTS

Cast iron, outside shell japanned, inner cup white enameled, wire bails, copper finish.

PRICE LIST

Nos.....	00	0	1	2	3	4
Cap. Cup, Pts.....	1	$1\frac{1}{4}$	$1\frac{1}{2}$	2	3	4
Cap. Pot, Pts.....	2	3	4	5	7	9
Wt. each, lbs.....	3	5	5	$6\frac{1}{2}$	$7\frac{1}{2}$	9
Price each.....	\$1.25	1.35	1.60	2.00	2.50	3.00



FIG. 1770

THERMO ELECTRIC GLUE POTS OR HEATERS

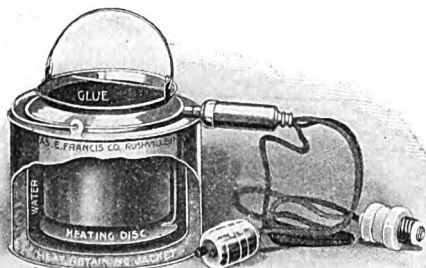


FIG. 1771

The most complete and economical type of Electric Glue Pot. Its design and insulation prevent loss of radiation, waste of current and keep consumption of electricity down to the minimum.

Made in three types: Immersion Disc (two heats); Immersion Coil (one or three heats) or Straight Form Unit (one or three heats). Can be furnished with one or two glue pots in capacities from 1 pint to 8 quarts for 110 or 220 volts. Unless otherwise ordered, the Glue Cup, Water Jacket and Heat-Retaining Jacket are furnished of copper strongly made. Cast Aluminum Glue Cup furnished if desired, in place of copper Glue Cup. Each Thermo Glue Pot is regularly supplied with suitable cord, plug, and switch for 110 volts, lamp socket, plug and snap switch is furnished unless otherwise ordered, and for 220 volts it is regularly supplied with porcelain wall socket and plug. Prices upon application.

GLUE BRUSHES

Round, White Bristle; Iron Handle.

PRICE LIST

Nos.....	1	2	3
Diameter, inches.....	$\frac{1}{8}$	$\frac{1}{4}$	1
Length of Bristles, inches.....	$1\frac{3}{4}$	$1\frac{3}{4}$	$2\frac{3}{8}$
Weight per doz. lbs.....	2	$2\frac{1}{4}$	$2\frac{1}{2}$
Price, each.....	\$0.35	.40	.60

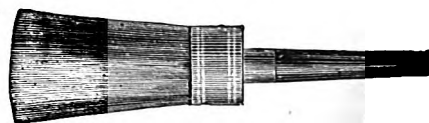


FIG. 1772

GOODELL ALL-STEEL MITRE BOXES

WITH SAWS

Bessemer steel base and frame, cold rolled sheet steel corrugated back which gives clearance for saw dust, graduated arc can be set at any desired angle, also provided with automatic stop which holds up saw permitting operator to use both hands in placing the work; allows a cut of $10\frac{1}{2}$ inches wide at right angles and $7\frac{1}{4}$ inches at a 45° angle, can be furnished with attachment to increase angle over 45° .

PRICE LIST

No. 1285	Size 3, with saw 28x5 inches, without increase angle attachment, wt. boxed, each 35 lbs.....	each	\$17.50
No. 1285	Size 3, with saw 28x5 inches, with increase angle attachment, wt. boxed, each 36 lbs.....	each	19.00
No. 1305	Size 3, with saw 30x5 inches, with increase angle attachment, wt. boxed, each 37 lbs.....	each	20.00
No. 1306	Size 4, with saw 30x6 inches, with increase angle attachment, wt. boxed, each 38 lbs.....	each	22.00

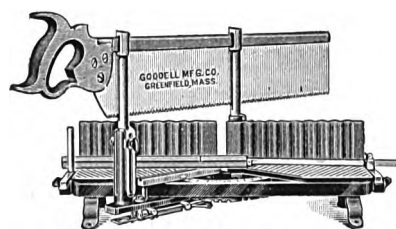


FIG. 1787

Illustration shows Mitre Box equipped with Increase Angle Attachment

SAWS

KEYHOLE
DISSTON NO. 5

FIG. 1773

An inexpensive and convenient combination of keyhole saw, saw pad and screw driver.
Weight 2½ lbs. per doz.

Price each..... \$0.35

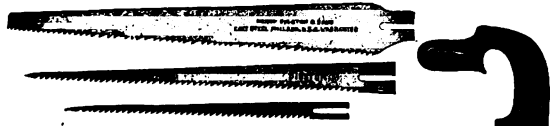
NEST OF SAWS
DISSTON NO. 3

FIG. 1775

Extra quality spring steel; applewood handles. With keyhole, compass and pruning blades.
Weight 12 lbs. per doz.

Price each..... \$2.20

TURNING

MILLERS FALLS NO. 357

A serviceable saw for cabinet workers and carpenters in doing irregular work, such as cornice, grills, etc. The friction on the handles is regulated by screws. Birch handles bonized; steel tension rod.

Cap. inches	12	14	18	20	22	24
Weight per doz. lbs.	13	17	18½	19½	21	22
Price each, including one blade.....	\$1.95	\$2.00	\$2.10	\$2.20	\$2.25	\$2.35
Extra blades, per doz.....	3.20	3.80	5.10	5.50	5.90	6.50

Saw Blades regularly furnished are ⅜-inch wide.

COMPASS
DISSTON NO. 2

FIG. 1774

Cast Steel Blade. Applewood Handle.

Price List

Length Blade inches.....	10	12	14	16
Weight per doz. lbs.....	5½	6	6½	7
Price, each.....	\$0.75	.75	.80	.80

EXTRA PARTS

	Length Inches	Wt. Doz. lbs.	Price Per Doz.
Keyhole Blades.....	10	1	\$5.00
Compass Blades.....	14	1½	5.50
Pruning Blades.....	16	3	11.00
Handles & Screws.....	..	4	4.00

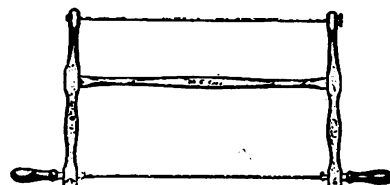


FIG. 1776

PIERCING

MILLERS FALLS NOS. 380, 381 AND 382

Especially designed for silversmiths, workers in arts, crafts, etc. Strongly made with a twist in forward end of frame to give the desired spring. Has hardened steel clamps with convenient thumb nuts. The handle is shaped to fit the hand and the end adapted to rest against the body of the operator when adjusting blades into the frame. Stiff burnished spring steel; stained and polished hardwood handle.

Nos.	380	381	382
Depth under back, inches.....	4	5	6
Weight per dozen pounds.....	6	6¼	6½
Price, each.....	\$1.80	1.95	2.10

COPING

MILLERS FALLS NO. 42

The best, easiest operated, and most convenient coping saw on the market and a great time-saver. The frame can be set so that it swings free without reference to the direction the blade takes in sawing. This obviates the necessity of stopping work to change the angle of the blade. The ball bearings are located under the outer head and permit the free action of the blade at the same time insuring its constant alignment. A circle can be cut out with this saw without stopping to adjust it. When desired the blade can be locked rigid in the frame facing in any one of four directions. There are locking devices at both ends of the blade. Heavy steel wire, nicked; rare tropical wood handle. Weight 6 lbs. per doz. Price each, including three 6x⅜-inch blades \$1.95
Extra Blades price per dozen..... \$0.50

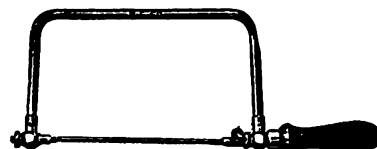


FIG. 1778

SCROLL SAW BLADES

Nos.....	1 to 6	7	8	9	10
Price per gross.....	\$2.00	2.20	2.20	2.20	2.30

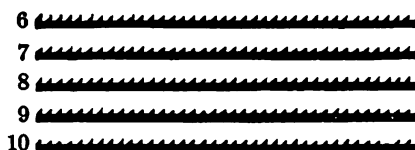


FIG. 1780

FIG. 1779

SAWS



FIG. 1781

PANEL, HAND AND RIP NO. 12

Straight back, extra refined spring steel blade, selected and highly polished, patent ground and tempered, hand set and filed, carved and polished applewood handle, four brass screws.

PRICE LIST

	Panel				Hand		Rip	
Length, inches.....	18	20	22	24	26	28	26	8
Points to, inch.....	8 to 12	7 to 12	8 to 12	8 to 12	6 to 12	6, 7, 8	5, 5½, 6	4½ to 6
Weight doz. lbs.....	14	16	20	22	26	30	26	30
Price each.....	\$3.35	3.75	4.00	4.60	4.35	5.00	4.35	5.00

ONE MAN CROSS CUT LANCE TOOTH

Made of the highest grade crucible steel, polished and carefully ground, thin back, teeth set and filed, beechwood handles, regular handle has edges varnished, supplementary handle is plain.

PRICE LIST

Length, feet.....	3½	4	4½	5
Weight, each lbs.....	4	5	6	7
Price, each.....	\$4.00	\$5.00	\$5.75	\$6.25



FIG. 1782

CROSS CUT



FIG. 1783

Made of the highest grade crucible steel, polished and carefully ground, teeth set and filed.

PRICE LIST

Length, feet.....	6	6½	7	8	8½	9	10	12
Width at center, inches.....	6½	6¾	7	7½	7¾	8	8½	9½
Price 12 and 17 Gauge, each.....	\$13.60	15.60	18.00	22.80	27.94	29.50	37.04	55.72

NARROW CROSS CUT

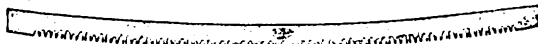


FIG. 1784

Made of the highest grade crucible steel, 14 gauge, polished and carefully ground, teeth set and filed.

PRICE LIST

Length, feet.....	4½	5	5½	6	6½	7
Weight, each, lbs.....	3	4	4½	5	6	6½
Price 14 Gauge, each.....	\$3.24	3.60	3.96	4.32	4.68	5.04

CROSS CUT SAW HANDLES

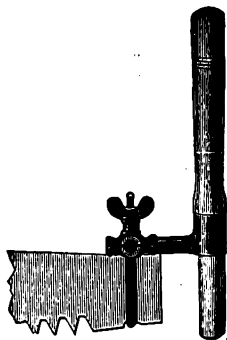
NO. 113 REVERSIBLE

14½ inches long, 1 ⅞ inches diameter, double grip, reversible, heavy malleable iron castings, loop rod.
Per Pair..... \$1.25

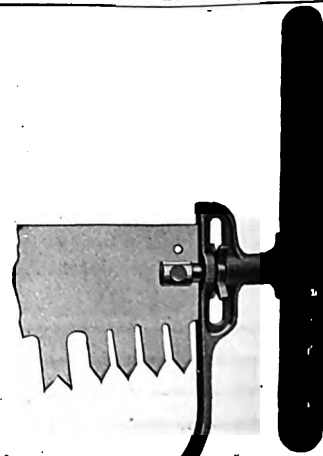
NO. 120

Made of selected thoroughly seasoned hardwood, well finished. Length 12 inches, diameter at thickest part 1 ⅞ inches. Extra heavy best malleable iron castings, bolt and nut.

This design eliminates the use of a nut at the back of handle and provides a good, easy and comfortable grip for a direct thrust. Another new feature is the "Sprocket Nut" by means of which the handle is quickly and firmly attached to the saw.
Price, per pair..... \$1.50



NO. 113-FIG. 1785



NO. 120-FIG. 1786

DRAG SAWS


PACIFICO TOOTH—FIG. 5145

TRIPLE TOOTH, SINGLE HOOK—FIG. 5146

DOUBLE TOOTH, SINGLE RAKER—FIG. 5147

TAPER

Price per Foot

Tapered 10 inch butt, 8 inch pt., 8 gauge.....	\$3.24
Tapered 8 inch butt, 6 inch pt., 10 gauge.....	1.86
Tapered 8 inch butt, 6 inch pt., 10-12 gauge.....	2.05

Taper drag saws wider or thicker than above will be figured by the lance tooth drag saw list below, using the average width as basis.

If drag saws are taper ground, advance 5 per cent for each gauge beveled.

LANCE TOOTH AND SAWS OF EQUAL WIDTH

PRICE, PER FOOT

Width Inches	Gauge						
	4	5	6	7	8	9	10
16	\$8.40	\$7.92	\$7.20	\$6.60	\$6.12	\$5.64	\$5.16
14	7.20	6.72	6.12	5.64	5.16	4.68	4.32
12	6.24	5.76	5.16	4.68	4.32	3.96	3.60
10	5.16	4.80	4.32	3.96	3.60	3.24	3.00
8	4.44	4.08	3.60	3.24	3.00	2.76	2.52

Saws with special patterns of teeth, special prices.

If drag saws are taper ground advance 5% for each gauge beveled.

GROOVING SAWS



FIG. 1793

PRICE LIST

Diameter Inches	Thickness						
	1/8 Inch	1/16 Inch	1/4 Inch	1/8 Inch	3/8 Inch	1/2 Inch	1/2 Inch
4	\$1.80	\$2.50	\$4.80	\$5.50	\$6.20	\$6.80	\$7.60
5	2.00	2.80	5.60	6.40	7.20	8.00	8.80
6	2.30	3.20	6.40	7.30	8.20	9.10	10.00
7	2.70	3.70	7.20	8.20	9.20	10.20	11.20
8	3.20	4.30	8.00	9.20	10.40	11.60	12.70
9	3.80	5.00	9.00	10.30	11.60	12.90	14.30
10	4.40	5.80	10.00	11.40	12.90	14.40	15.90
11	5.00	6.70	11.00	12.60	14.20	15.90	17.60
12	5.70	7.70	12.00	13.80	15.60	17.40	19.20

When ordering specify width of groove to be cut.

BAND SAWS

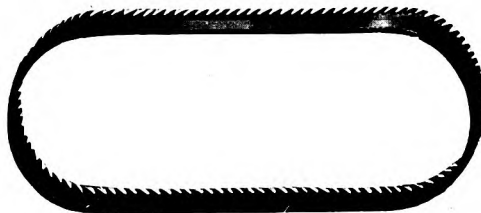


FIG. 1788

NARROW

PRICE LIST—NOT BRAZED, FILED OR SET

Wid. In.	Usual Gauge	Number of Teeth to Inch	Price perFoot
$\frac{1}{8}$	22 or 23	6 or 7	\$.14
$\frac{1}{8}$	21 or 22	6	.16
$\frac{1}{4}$	21 or 22	5 or 6	.18
$\frac{3}{8}$	21 or 22	4 or 5	.20
$\frac{1}{2}$	21 or 22	$3\frac{1}{2}$ or 4	.22
$\frac{5}{8}$	20 or 21	$3-3\frac{1}{2}$ or 4	.26
$\frac{3}{4}$	20 or 21	$2\frac{1}{2}$ or 3	.30
$\frac{7}{8}$	20 or 21	$2\frac{1}{2}$ or 3	.34
1	20 or 21	$\frac{1}{2}$ in. or $\frac{5}{8}$ in. pt. to pt.	.38
$1\frac{1}{8}$	19 or 20	$\frac{1}{2}$ in. or $\frac{5}{8}$ in. pt. to pt.	.42
$1\frac{1}{4}$	19 or 20	$\frac{1}{2}$ in. $\frac{5}{8}$ in. or $\frac{3}{4}$ in. pt. to pt.	.46
$1\frac{3}{8}$	19 or 20	$\frac{1}{2}$ in. $\frac{5}{8}$ in. or $\frac{3}{4}$ in. pt. to pt.	.52
$1\frac{1}{2}$	19 or 20	1 in. or $1\frac{1}{4}$ in. pt. to pt.	.58
$1\frac{3}{4}$	19 or 20	1 in. or $1\frac{1}{4}$ in. pt. to pt.	.64

WIDE

PRICE LIST—BRAZED AND FITTED

Width	Usual Gauge	Price per Foot
2 inch	18 to 20	\$1.60
$2\frac{1}{2}$ "	18 to 20	2.00
3 "	18 to 20	2.40
$3\frac{1}{2}$ "	18 to 20	2.80
4 "	17 to 19	3.20
$4\frac{1}{2}$ "	17 to 19	3.60
5 "	17 to 19	4.00
$5\frac{1}{2}$ "	17 to 19	4.40
6 "	17 to 19	4.80
7 "	16 to 18	5.60
8 "	14 to 16	6.40
9 "	14 to 16	7.20
10 "	14 to 16	8.00
11 "	14 to 16	9.00
12 "	13 to 15	10.00

SPECIAL NOTICE

In ordering state length, width and gauge, also whether saws are wanted brazed, set and filed.

FILING AND SETTING EXTRA NARROW BAND SAWS

Setting and Filing, each.	\$1.50
Brazing Band Saws up to $\frac{7}{8}$ -inch, each. ....	.75
Brazing Band Saws 1 to $1\frac{3}{4}$ inch, each.	1.00

Saws of odd widths, not listed, take price of next wider size listed.

For saws of heavier gauge than listed add 5 per cent to list for each gauge heavier.

No extra charge for saws one or two gauges thinner than list. When more than two gauges thinner, add 5 per cent. to list for each gauge.

Double edge band saws. List price per foot, all widths: advance 10 per cent. over list prices of single edge saws as above. Toothed blanks. Same price as finished saws.

Band saw blanks. Bright, of any width, furnished to order but not warranted.

CIRCULAR SAWS

INFORMATION FOR ORDERING—THE FOLLOWING INFORMATION IS VERY ESSENTIAL IN PLACING CIRCULAR SAW ORDERS

Solid or Inserted Tooth?
Thickness of gauge at center, at rim?
Right or left hand?
About what number of teeth?
Any special shape tooth wanted (if so send rough sketch and give number of teeth.)
What size mandrel hole, also what size pin hole?
What is the distance between pin holes from center to center?
Greatest feed in inches at each revolution?
Kind of lumber to be sawed?

What size horse power engine will drive this saw?

Number of revolutions saw makes while in cut per minute

Always state whether rip or cross cut saws are wanted

All stock saws 40 inches and above have a 2-inch eye and two pin holes $\frac{5}{8}$ in. on a 3 in. circle. If difference is wanted please send a templet.

Follow out the above instructions carefully. We will guarantee the purchaser against the slightest trouble no matter whether he uses a solid or inserted tooth.

THE SPEED OF SAWS

MILL MEN'S opinions vary as regards the proper speed for circular saws, but from our own observation, and the experience of some of the best sawyers and millwrights in the country, we have been led to adopt, as the medium speed of all sizes of circular saws, a motion of ten thousand feet per minute on the rim; and the following is a table giving the number of revolutions per minute for the various sizes of circular saws:

Inches Diameter	Rev. per Min.	Inches Diameter	Rev. per Min.	Inches Diameter	Rev. per Min.	Inches Diameter	Rev. per Min.
8	4,600	24	1,630	44	890	60	640
10	3,920	28	1,400	48	815	64	600
12	3,260	32	1,225	52	750	68	560
16	2,459	36	1,080	56	700	72	530
20	1,960	40	980				

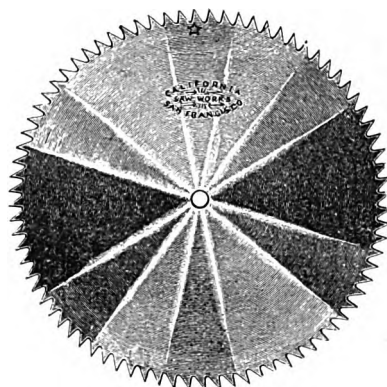
RIP AND CROSS-CUT SAWS—SOLID TOOTH

PATENT GROUND AND TEMPERED

When ordering, always state whether Rip or Cross-Cut Saws are desired; also if right or left hand.



RIP—FIG. 1789



CROSS CUT—FIG. 5149

PRICE LIST APPLIES TO RIP AND CROSS-CUT SAWS

Diameter Inches	Thickness Gauge	Size Hole Inches	Price Each	Extra for Each Gauge Heavier	Beveling New Saws Per Gauge	Net Prices Extra for Setting & Sharpening if	
						Rip	Cross-cut
1	24	$\frac{3}{8}$	\$1.20	\$.01	\$.06	\$.03	\$.04
1½	24	$\frac{3}{8}$	1.20	.01	.07	.03	.05
2	23	$\frac{3}{8}$	1.20	.01½	.08	.04	.05
2½	22	$\frac{3}{8}$	1.20	.02	.09	.04	.06
3	21	$\frac{1}{2}$	1.20	.02½	.10	.05	.06
3½	20	$\frac{1}{2}$	1.20	.03	.12	.05	.07
4	19	$\frac{3}{4}$	1.20	.03	.14	.06	.07
6	18	$\frac{3}{4}$	1.80	.05	.18	.07	.10
7	18	$\frac{3}{4}$	2.10	.06	.20	.08	.11
8	18	$\frac{7}{8}$	2.40	.08	.22	.10	.13
9	17	$\frac{7}{8}$	2.80	.10	.25	.11	.14
10	16	1	3.30	.12	.28	.12	.16
11	16	1	3.90	.16	.30	.13	.18
12	15	1	4.40	.20	.35	.15	.20
14	14	$1\frac{1}{8}$	5.30	.25	.40	.18	.23
16	14	$1\frac{1}{8}$	6.50	.30	.50	.20	.25
18	13	$1\frac{1}{4}$	8.00	.40	.60	.23	.28
20	13	$1\frac{1}{4}$	9.50	.50	.70	.25	.32
22	12	$1\frac{1}{2}$	11.50	.60	.80	.28	.35
24	11	$1\frac{3}{8}$	13.50	.70	.90	.31	.40
26	11	$1\frac{3}{8}$	16.00	.85	1.05	.35	.45
28	10	$1\frac{1}{2}$	18.50	1.00	1.20	.38	.50
30	10	$1\frac{1}{2}$	21.00	1.15	1.30	.42	.55
32	10	$1\frac{5}{8}$	24.00	1.30	1.40	.45	.60
34	9	$1\frac{5}{8}$	27.00	1.50	1.55	.50	.65
36	9	$1\frac{5}{8}$	31.00	1.80	1.70	.55	.70
38	9	$1\frac{5}{8}$	35.00	2.00	1.85	.60	.75
40	9	2	41.00	2.30	2.00	.65	.80
42	8	2	47.00	2.60	2.20	....	.85
44	8	2	55.00	3.00	2.40	....	.90
46	8	2	65.00	3.50	2.60	....	1.00
48	8	2	75.00	4.00	2.80	....	1.10
50	7	2	85.00	4.50	3.00	....	1.20
52	7	2	95.00	5.00	3.25	....	1.30
54	7	2	105.00	6.00	3.50	....	1.40
56	7	2	120.00	7.00	3.75	....	1.50
58	7	2	135.00	8.00	4.05	....	1.60
60	6	2	150.00	9.00	4.35	....	1.70

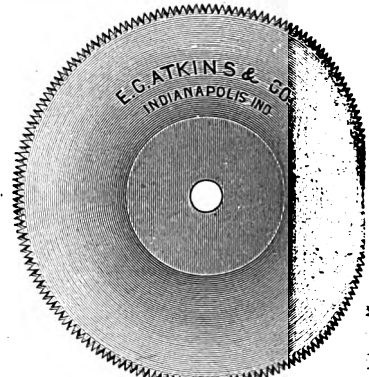
FIG. 1790
SPLITTING

CIRCULAR MITRE AND NOVELTY SAWS

Novelty saws are furnished for either cutting off or splitting. When ordering specify which is desired.

Novelty saws will not cut as fast as saws with ordinary splitting or cutting-off teeth, and their use is not advised, when crowding the work is considered of more importance than smoothness in finish.

Mitre saws and novelty saws are both ground to run without set, and are especially adapted to smooth cutting, such as cabinet and cigar box work.

FIG. 1791
CUTTING-OFF

PRICE LIST

Size Inches	Gauge at Hole	Gauge at Edge of Collar	Gauge at Teeth	Extra for Each Gauge Heavier	Extra for Each Additional Gauge Bevel'g	Price Each	Size Inches	Gauge at Hole	Gauge at Edge of Collar	Gauge at Teeth	Extra for Each Gauge Heavier	Extra for Each Additional Gauge Bevel'g	Price Each
4	18	21	18	\$.03	\$.28	\$3.00	12	14	17	14	\$.20	\$.70	\$ 8.50
5	17	20	17	.04	.32	3.60	14	13	16	13	.25	.80	9.80
6	17	20	17	.05	.36	4.20	16	13	16	13	.30	1.00	11.00
7	16	19	16	.06	.40	4.80	18	12	15	12	.40	1.20	13.20
8	16	19	16	.08	.44	5.40	20	12	15	12	.50	1.40	16.20
9	15	18	15	.10	.50	6.00	22	11	14	11	.60	1.60	19.00
10	15	18	15	.12	.56	6.70	24	11	14	11	.70	1.80	22.00
11	14	17	14	.16	.60	7.50							

Above list includes filing teeth, so that saw is ready for use.

CHISEL TOOTH

PRICE LIST



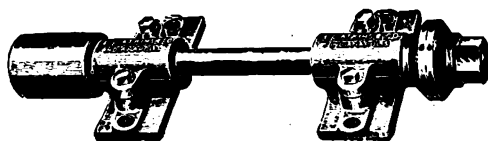
FIG. 1792

Two extra shanks furnished with saws 40 inches diameter and less.

Three extra shanks furnished with saws 42 inches diameter and over.

Diam. Inches	Thick- ness Gauge	Stand- ard Number of Teeth No. 2 1/2	3 and 30	Price Each No. 2 1/2	Price Each Nos. 3 and 30	Extra Each Gauge Heavier	Price for Bevel'g New Saws per Gauge
12	11	12	..	\$19.50	.....	\$0.20	\$0.35
14	10	14	..	23.00	.....	.25	.40
16	10	16	12	27.00	\$27.00	.30	.50
18	10	18	14	31.00	30.00	.40	.60
20	9	20	14	36.00	34.00	.50	.70
22	9	22	16	42.00	38.50	.60	.80
24	9	24	18	46.00	42.00	.70	.90
26	9	26	18	52.00	46.00	.85	1.05
28	9	28	18	56.00	50.00	1.00	1.20
30	9	30	20	60.00	54.00	1.15	1.30
32	8	32	22	68.00	61.00	1.30	1.40
34	8	36	22	75.00	66.00	1.50	1.55
36	8	38	24	85.00	72.00	1.80	1.70
38	8	40	24	95.00	78.00	2.00	1.85
40	8	42	26	105.00	84.00	2.30	2.00
42	8	44	28	115.00	94.00	2.60	2.20
44	8	46	30	125.00	102.00	3.00	2.40
46	8	48	32	135.00	110.00	3.50	2.60
48	8	50	34	148.00	120.00	4.00	2.80
50	8	52	36	162.00	134.00	4.50	3.00
52	7	56	38	178.00	156.00	5.00	3.25
54	7	58	40	198.00	174.00	6.00	3.50
56	7	60	42	210.00	194.00	7.00	3.75
58	7	62	44	230.00	212.00	8.00	4.05
60	7	64	46	258.00	230.00	9.00	4.35
62	6	66	48	280.00	260.00	10.00	4.65
64	6	68	48	310.00	290.00	12.00	5.00
66	6	72	50	340.00	320.00	15.00	5.35
68	6	76	52	380.00	350.00	18.00	5.75
70	6	78	54	420.00	380.00	21.00	6.15
72	6	80	56	460.00	420.00	24.00	6.55

FIG. 5153
NO. 2 1/2FIG. 5154
NO. 3FIG. 5155
NO. 30

SAW MANDRELS**CIRCULAR****CAST STEEL—SELF-OILING BOXES****FIG. 1796**

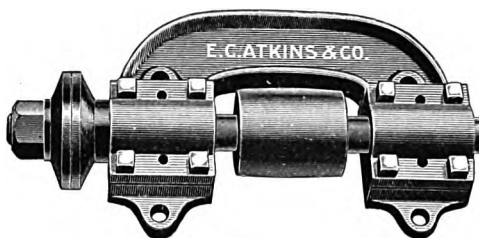
The shaft is lathe turned from the highest grade of steel, pulleys are cast from soft gray iron, also lathe turned and shrunk to the shaft. The boxes are very heavy with wick-oiling chambers babbitted with anti-friction metal.

We will fill orders for mandrels with pulley outside of boxes unless otherwise ordered.

PRICE DOES NOT INCLUDE SAWS

No.	Extreme Length Inches	Diameter of Arbor Inches	Diameter of Pulley Inches	Face of Pulley Inches	Diameter of Collar Inches	Size of Hole in Saw Inches	Size of Saw Inches	Price Each
1	16½	1 1/8	3	3	3	1	10 to 12	\$16.00
2	19	1 1/8	3	3½	3	1	10 to 12	17.00
3	21½	1 1/8	3	4	3½	1 1/8	14 to 16	19.00
4	24	1 1/8	3½	4½	3½	1 1/8	14 to 16	21.50
5	26	1 1/8	4	5	4	1 1/4	18	25.00
6	28	1 1/8	4½	5½	4	1 1/4	18	28.00
6½	30½	1 1/8	5	6	4½	1 1/4	20 to 22	32.00
7	30½	1 1/8	5	6	4½	1 3/8	24 to 26	32.00
8	33½	1 1/8	5½	6½	4½	1 3/8	24 to 26	36.00
9	37	1 1/8	6	7	4½	1 1/2	28 to 30	45.00
10	41	1 1/8	7	8	5	1 5/8	32 to 38	56.00
11	44½	1 1/8	8	10	5	1 5/8	32 to 38	67.00
12	48	1 1/8	10	10	5	1 5/8	32 to 38	80.00
13	54	2 1/8	12	10	5	2	40 and over	100.00

Mandrels with pulley outside are made with pulley on right hand side, with left hand thread, unless otherwise ordered.

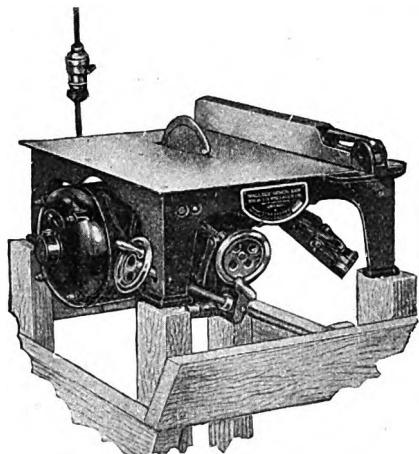
YOKE**CAST STEEL—SELF-OILING BOXES****FIG. 1798**

These mandrels are in perfect balance. Being lathe-turned, every part runs truly and smoothly, avoiding jar and insuring rigidity. When ordering send sketch and give distance from saw to end of mandrel, if the pulley is between the bearings.

PRICE DOES NOT INCLUDE SAWS

No.	Out to Out Boxes Inches	Diameter of Arbor Inches	Pulley		Size of Collar Inches	Size Hole in Saw Inches	Size of Saw Inches	Price Each
			Diameter Inches	Face Inches				
1	10	1 1/8	2½	3	3	7/8	6	\$18.00
2	14	1 1/8	3	4	3	7/8	8 to 10	21.00
3	16	1 1/8	3½	4½	3	1	12 to 14	24.00
4	18	1 1/8	4	5	3½	1 1/8	16 to 18	28.00
5	20	1 1/8	4½	5½	3½	1 1/4	20 to 24	32.00
6	22	1 1/8	5	6	4	1 3/8	26 to 28	36.00
7	24	1 1/8	6	7	4½	1 1/2	30 to 36	40.00

THE WALLACE CIRCULAR BENCH SAWS



UNIVERSAL—FIG. 5027

These machines have been designed with the idea of doing away with the slow and costly hand sawing and to save the time wasted in the shop going back and forth across the floor to the big stationary machines. Eighty per cent of the work in the average shop can be handled on the Wallace Bench Saws right at the bench. These machines will handle any stock including the hardest woods up to two inches thick and from five to six feet in length. Longer stock can be handled with roller rest. These machines are made in two types, the Universal cutting at any angle, cross cut or rip, and the Cut Off and Rip Saw, which is very similar to the Universal Saw except that it cuts only at an exact right angle on the rip but at any angle on the cross cut.

These machines operate directly from their own motor from an ordinary light circuit, are complete units and can be set wherever a light socket is available. The shipping crate when turned upside-down becomes a solid stand of exactly the right height on which the machine can be placed. The crate is made with this definite purpose in mind—to save even the cost of a stand on which to place the machine. It can be moved whenever you wish without additional expense. The cost of the unit is the only cost, nothing added for lineshaft, countershaft nor for the heavy labor cost of setting up and moving. These machines are provided with a saw guard that is thorough in its protection. It protects the operator's hand as the stock passes through the machine; it prevents the tail end of the stock from catching in the rear end of the saw (a frequent cause of accidents). All the parts which are subject to unusual strain are made of semi-steel or malleable iron.

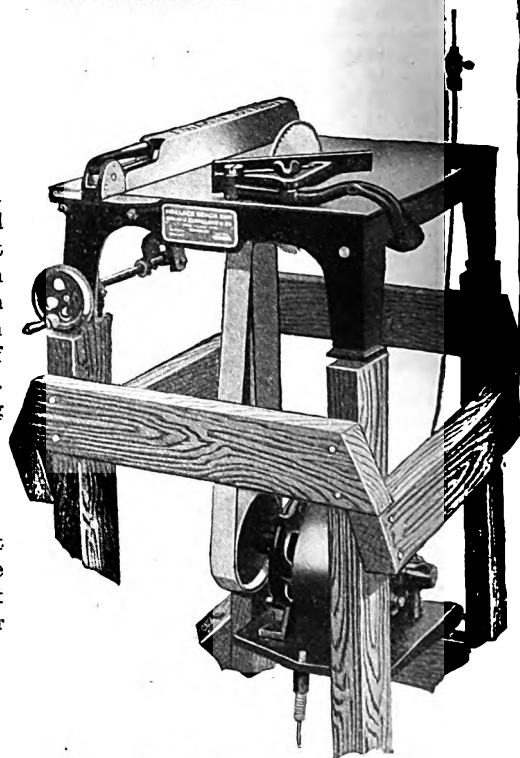
UNIVERSAL SAW

CUTS AT ANY ANGLE—CROSS CUT OR RIP

The tilting mechanism is quite an ingenious arrangement—controlled by a hand wheel at the left side of the machine in a readily accessible and convenient position. This hand wheel is fastened to an accurately cut screw which works on a swiveled nut. When turned, the cradle on which the motor, gear housing, saw, etc., are mounted, swings into the position desired. The action of the screw is very easy and yet it stays rigidly in any position. The saw is easily and quickly raised or lowered by means of another hand wheel mounted similar to the one by which the saw is tilted. This hand wheel is in the front of the machine. By raising and lowering you can cut any depth up to two inches.

CUT OFF AND RIP SAW

This machine is in every way similar to the Universal Bench Saw except that it lacks the Universal Angle feature—cuts only at an exact right angle on the rip but at any angle on the cross cut. When electric current is not available this machine can be supplied with pulley and countershaft for drive from line shaft.



CUT OFF AND RIP—FIG. 5028

SPECIFICATIONS

	Universal	Cut Off and Rip
Diameter of Saw, inches.....	7	7
Size of Table, inches.....	17 x 20	17 x 20
Size of Motor, horsepower.....	$\frac{1}{2}$	$\frac{1}{2}$
Speed of Saw, R. P. M.....	5200	*5200
Height, foot to table top, inches.....	$6\frac{7}{8}$	$6\frac{7}{8}$
Height, including stand, inches.....	36	36
Weight of saw including motor, pounds.....	115	90
Shipping weight, pounds.....	150	130
Price with c/s or motor platform, but no motor.....	not furnished	.....
Price complete with D. C. Motor.....	.....	.....
Price complete with A. C. Motor.....	.....	.....

*Speed of saw for metal 2500 R. P. M.

When ordering give current and voltage; if A. C. state cycle and phase.

WALLACE 14-INCH BENCH BAND SAW

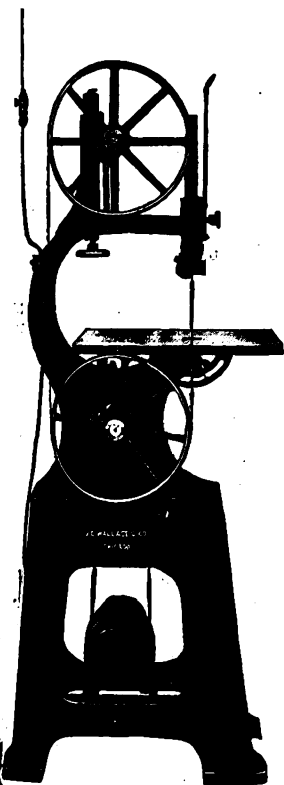


FIG. 5026

In many shops the big band saw is so very busy that several men are always waiting their turn to use it. These smaller saws can be distributed about the shop so that they will be convenient to every operator, thus saving the time now wasted by men walking back and forth between the benches and the stationary machines. This method will eliminate all useless waiting at the large saw. Moreover it will save 50 per cent in power consumption. The upper wheel is fitted to a shaft running in a double yoke box, $5\frac{1}{2}$ -inch bearing. It has an improved tilting device for shifting the blade of the saw to the desired path. We generally furnish guides as shown in the illustration. The guide post is of square steel accurately finished and perfectly true. It can be clamped at any point by the hand wheel. There is a $5\frac{1}{2}$ -inch working height under guide; $8\frac{1}{2}$ possible without guide. The table is extra heavy and well trussed; is planed exactly true and finished perfectly smooth. It can be tilted and held perfectly rigid at any angle up to 45 degrees. Operates on light circuit.

Size of wheels.....14 inches, 1 inch face	Height of machine.....6 feet 7 inches
Size of table..... $16\frac{1}{2} \times 19$ inches	Motor..... $\frac{1}{2}$ H. P.
Price complete with $\frac{1}{2}$ H. P. G. E. Motor, base, etc. (as shown in cut).....	
Price without motor or stand.....	

When ordering give current and voltage; if A. C., state cycle and phase.

BAND SCROLL SAWS

FOR FOOT OR BELT POWER

This cut shows a 26-inch Band Saw which is also made in 32 and 36-inch sizes. The 32-inch and 36-inch machines can be furnished with either iron or wood rim band wheels.

The 20-inch machine is made for foot power only, also as a combination foot and belt power machine.

For Band Saws of larger capacity see page 825.

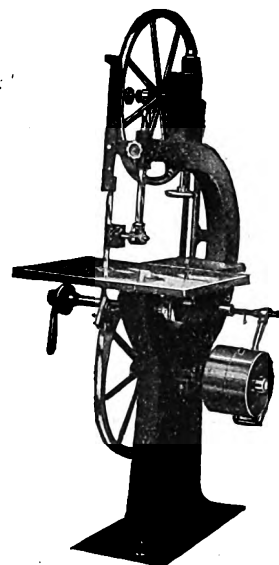


FIG. 3574

"SAFE-GUARDS" FOR WOODWORKING MACHINERY

PRACTICAL DEVICES THAT REALLY DO PROTECT OPERATORS WITHOUT INTERFERING WITH THEIR EFFICIENCY

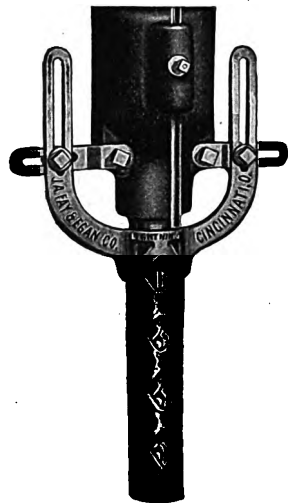


FIG. 1799

ALUMINUM BORING BIT GUARDS

The double lip of an unguarded boring bit, revolving at a high speed, quickly catches a sleeve or other part of clothing and in a twinkling causes a serious and even dangerous accident—the operator is disabled, you lose his services, pay his bills, and perhaps have a damage suit to boot.

A few dollars invested in Aluminum Guards avoids all danger. These guards are **LIGHT, STRONG, EFFICIENT** and will not interfere with operator. Easily applied by loosening the cap screws in spindle housings.

Each size has adjustment of 6 inches for varying bit lengths. In ordering, note sizes refer to diameter of CHUCK, not the bit.

These guards are particularly valuable in Railway Shops where Mortisers and Gainers are frequently equipped with boring attachments which are stopped and started by reaching around the revolving bit.

PRICE LIST

For Chucks up to 2½-inch diameter and bits 6 inches to 12 inches long.....	\$11.35
For Chucks up to 3 -inch diameter and bits 6 inches to 12 inches long.....	13.00
For Chucks up to 3¼-inch diameter and bits 14 inches to 20 inches long.....	14.65
For Chucks up to 3¾-inch diameter and bits 18 inches to 24 inches long.....	16.25

ALUMINUM RIP SAW GUARDS

No Guard ever placed upon the market met with the instantaneous success of these Aluminum Saw Guards. Over ten thousand of these guards have been sold and in every case are being used willingly by operators and giving satisfaction in every respect. This guard is light, strong and efficient. It consists of an iron plate which is set into the saw table. A steel upright or splitter is slipped into dovetailed slides in the plate. This splitter is set at such an angle that it can be easily removed by hand, but cannot be worked loose by any action of the saw. The hood or guard itself is made entirely of Aluminum and is mounted on the splitter with roller bearings. It is adjustable for various thicknesses by pin set, in addition to its automatic adjustment for varying thicknesses within a certain range. In the smaller sizes the hoods are shaped as shown in illustration, while in the larger sizes the sides are made lattice pattern to give additional strength. The operator can see the saw at all times. There is absolutely no chance of a piece kicking back. The hood cannot injure the blade if accidentally knocked into it, or mar the work in any manner.

Aluminum Guards can be applied to any make or type of Rip Saw. This same guard can be fitted to Double Cut-Off Saws, or any type of machine where the saw does not travel or the table tilt.

PRICE LIST

For Saws up to, inches.....	12	16	20	24	30
Price each, with Dovetail Plate and Splitter...	\$13.00	14.65	16.25	24.40	40.65



FIG. 1800

ALUMINUM UNIVERSAL AND TILTING TABLE SAW GUARDS

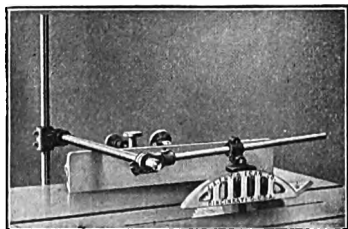


FIG. 1801

This type of guard is designed for use on Universal and Tilting Saw Tables where the regular type cannot be applied. It consists of an upright bar of cold-rolled steel set into a socket bolted on the frame of the machine. A compound horizontal bar carries the Aluminum hood. Vertical and horizontal adjustments of the hood are quickly made and it can be thrown back from the saw when necessary. This makes a very simple but effective rigging for this type of saw, doing away entirely with all overhead obstructions. Price complete, ready to apply..... \$40.65

Give size of blade when ordering.

SAFE GUARDS FOR WOODWORKING MACHINERY

THESE GUARDS ARE DESIGNED TO BE READILY ADAPTED FOR ALL SAWING MACHINERY

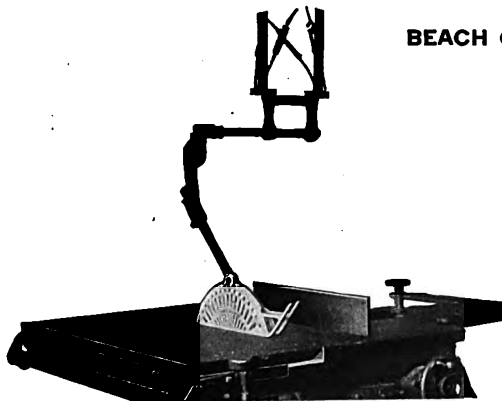


FIG. 1802

BEACH OVERHEAD SAW GUARD

This is a simple, efficient saw guard absolutely self-adjustable due to case-hardened steel rollers placed in the sleeve carrying the hood, allowing it to automatically raise and lower with the lumber being run. Being attached to the ceiling it leaves the entire top of the table clear for wide work. It is always over the saw for bevel work. In fact, it makes no difference how one tilts the table, the hood is over the saw, in position, always doing its duty.

It is adjustable, up or down, and right or left. It is easily turned back and pushed to one side for up-end work, or when necessary to change saws. No tools are needed. The Guard is made of square steel to insure stability. The Guard is shipped complete with the exception of the rods from the ceiling which are common 1-inch pipe. Always give the diameter of the saw to be covered. Made in the following sizes of hoods: 8, 12, 16, 20, and 24-inches. Larger sizes made to order. All hoods are aluminum.

BEACH TABLE SAW GUARD

This Guard is attached to the Saw Table by means of a clamp at the right hand side of the table, or to the pedestal by means of special casting. It is made of square steel, giving it great strength and rigidity. It is equipped with case-hardened steel rollers in the sleeve carrying the hood, making itself adjustable, and therefore very economical. The rollers allow the hood to automatically raise and lower with the lumber being run.

Made in the following sizes of hoods: 8, 12, 16, 20, and 24-inches. Larger sizes made to order. When ordering, always give the diameter of the saw to be covered and the distance from the saw to the right hand edge of the table. This Guard can be used on tilting tables when supported on the pedestal. All hoods are aluminum.

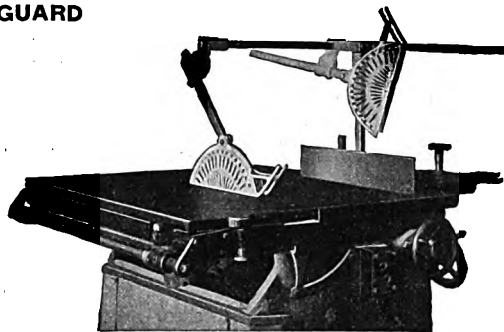


FIG. 1803

BEACH CEILING DOUBLE CUT-OFF SAW GUARD

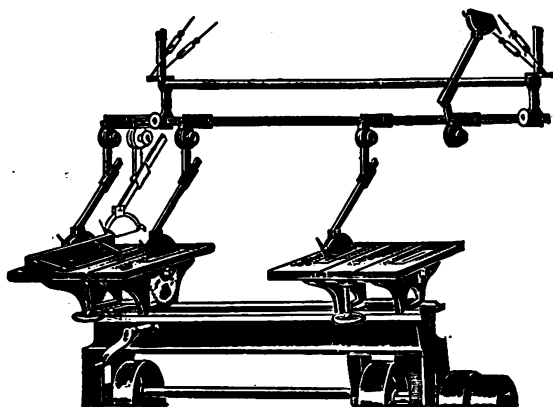


FIG. 1804

This Guard is similar in construction to the other Beach Guards. It is self-adjustable, being equipped with case-hardened steel rollers placed in the sleeve carrying the hood. All hoods have the steel dog to prevent the "kick back" of the lumber. The frame of the guard is made to carry practically any number of hoods, and each hood works independent of the others. This Guard is ideal for equalizing saws in stave factories, etc. Shipped complete, except the rods from the ceiling, which are common 1-inch pipe. Made in the following sizes of hoods: 8, 12, 16, 20, and 24 inches. Larger sizes made to order. When ordering, always specify diameter of the saws, and distance between outside saws, also number of hoods desired. All hoods are aluminum.

PRICE LIST

Overhead Guard		Hood Guard		Ceiling Double Cut-off Guard	
Hood In.	Price Each	Hood In.	Price Each	Hood In.	Price
8	\$24.30	8	\$24.30	Two 8	\$35.65
12	25.90	12	26.70	Two 12	37.25
16	27.50	16	29.10	Two 16	38.85
20	30.00	20	31.60	.....	.....
24	32.40	24	34.00	.....	.....

SAFE-GUARDS FOR WOODWORKING MACHINERY

ACKLEY FINGER SAVERS

STYLE A FINGER SAVERS FOR ATTACHING TO TABLE

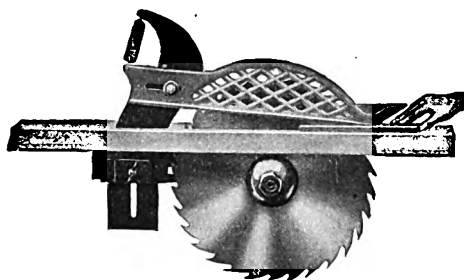


FIG. 1805

By using these guards as they should be used, it is impossible to get into the saw without coming in contact with the guard which is a warning that the saw is near.

These guards are easy to install and adjust and are for saws up to 20-inch and for stock of various thicknesses.

Style A Guards are for use on stationary tables only. They can be adjusted in-and-out and up-and-down for saws and stock of various sizes.

The bracket on Style A fastens to the table with screws, and has in-and-out adjustment. The splitter is held by a clamp and thumb nut and slides up and down for adjustment.

The hood is the same on both guards, covers the saw and swings on a large roll. A coil spring holds it to the table. The hood is set, so that the bottom is just above the stock, which prevents the stock from riding the saw and kicking back. It also keeps the sawdust from flying into the operator's eyes.

Always state size of saw the guard is to cover.

STYLE B FINGER SAVERS FOR ATTACHING TO CEILING

These guards are practical because they cannot be taken off the machines and hung upon the wall as is done with so many guards, but are always there and ready for use. They can be used on any style of machine, either stationary wooden tables, stationary or tilting iron tables and double cut-off machines. A special set of brackets and a cross-rail are furnished for the double cut-off guards, which allows for adjustment back and forth as well as up and down.

The brackets on Style B guards screw on to a piece of 1¼-inch iron pipe which screws into a plate. This plate is fastened to the ceiling directly in line with the saw and far enough back to allow the hood to set over the saw. Guide rods are fastened to the ceiling and the turnbuckles take away the vibration. The rod slides up and down and is held in position by the thumbscrew which sets in a groove in the rod.

Always state size of saw the guard is to cover.

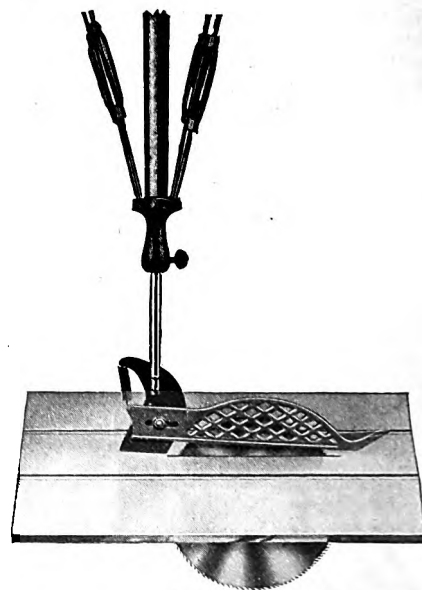


FIG. 1806

PRICE LIST

Style A. Complete, Price each	\$15.25	Style C. Double Cut-off with Two Guards, Cross Rail, Six Turn-Buckles, except the piece of 1¼-inch Pipe, Price each.....	\$67.50
Style B. Except the piece of 1¼-inch Pipe, price ea..	23.15		

IMPROVED SHAPER GUARD

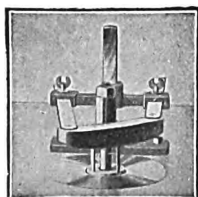


FIG. 1807

This Guard can be applied to any Shaper and will be found thoroughly effective. It is adjustable in all directions, complies with all safety laws and is recommended by Stat Factory and Liability Insurance Company Inspectors everywhere.

Price, Single Guard..... \$13.00 Per Pair..... \$24.40

SAFE GUARDS FOR WOODWORKING MACHINERY

ALUMINUM HAND PLANER GUARD

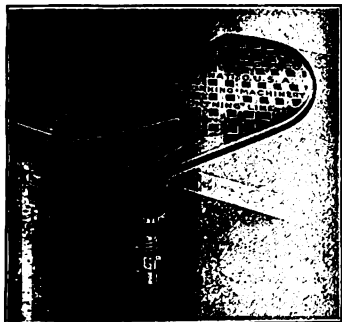


FIG. 1809

The only really practical Hand Planer Guard, as it affords perfect protection without any interference. Wing and Stem are of Aluminum, cast in one piece and slip onto a shaft set into a double bearing bolted to side of machine. Being made of Aluminum this wing is very light and does not require a heavy spring for its return, making movement both ways free and easy. Can be quickly applied by any one to any make of Hand Planer by simply drilling and tapping two screw holes in frame.

The unique design of the Aluminum wing has these advantages: (1), it completely covers the entire head when machine is not in use; (2), it uncovers only so much of the head as equals the width of stock being worked; (3), it uncovers head only when stock covers it; (4), when opened to extreme width of machine, wing does not project beyond rabbetting arm; (5), as it opens up it offers only one point, as a tangent to a circle, to the stock and therefore does not require any extra effort on part of operator to push stock through; (6), the automatic return of wing is accomplished quickly, but without a snap or jar by means of a spring, closing up the head opening as soon as the stock leaves it; (7), the latticed top enables operator to see the head while the openings are too small to allow even a finger to slip through; (8), the wing can be taken off the shaft when desired or can be opened full width and locked; (9), wing is always supported on table top and cannot be sprung out of shape.

This guard was designed in accordance with suggestions received from leading safety engineers and operators of Hand Planers. It is the first really practical Hand Planer Guard and as such is endorsed by users and recommended by all State Factory and Liability Insurance Company Inspectors.

Perfect protection.

No interference.

Fits any Hand Planer.

Easily applied.

Automatically covers all, except just that part of head in use.

The first really practical Hand Planer Guard.

6 1/2-inch.....	\$ 9.75
8-inch.....	13.00
12-inch.....	16.25
16-inch.....	19.50
20-inch.....	26.00

Complete, ready to apply.

WIRE MESH BAND SAW GUARDS

These guards have proved very popular as they give complete protection and still leave all working parts visible. They are made of a heavy meshed wire screen with an angle iron frame, hinged to a bar bolted to frame of machine. These guards open and close like doors, giving quick and easy access to all working parts.

We furnish these guards for both wheels or upper wheel only.

For any size Wheel up to 42-inch, per set.....	\$48.75
Upper Wheel only.....	24.40

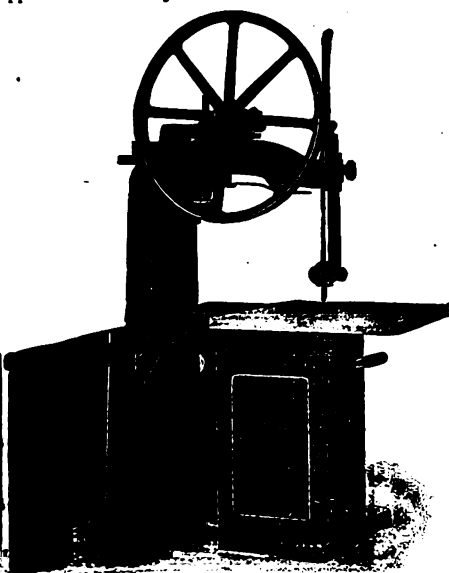


FIG. 1810

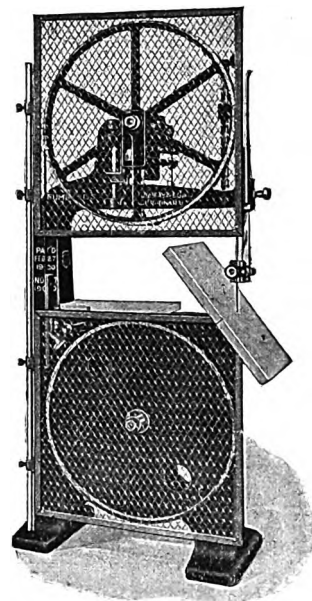


FIG. 1808

IRON DOORS FOR BAND SCROLL SAWS

Most State Laws require the lower wheel of a Band Scroll Saw to be entirely closed in. The iron door arrangement herewith meets this requirement in every respect and as the doors are of cast iron, neatly designed and finished, they are in many cases used as a matter of preference as they add greatly to the appearance of the machine. When these doors are used, the upper wheel is either left open, fitted with a wire mesh guard as shown above or covered with a home-made hood of wood. These doors are furnished only for Fay & Egan, Nos. 155, 192, 50, 345 and 58 Band Saws. To apply them requires only the drilling and tapping of a few holes in the frame.

Complete, per pair.....	\$56.90
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SAFE-GUARDS FOR WOODWORKING MACHINERY

SAFETY CUTTER HEADS

With thin air hardened steel knives, prevent serious Hand Planer accident and do smoother work. By jointing off occasionally knives will run for a week with one sharpening. Can be applied to any Hand Planer. Change your dangerous square head machine to a modern round head tool.

Price List of
Two-Knife Circular
Cylinders
complete

Price List of
Universal
Heads

Owing to the almost daily changes in price of high grade steels used in making these heads we have had to withdraw our price lists and quotations will be made on request, based on steel prices prevailing at the time.

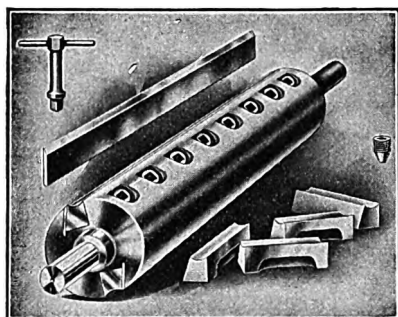


FIG. 1811

8-inch.....
12-inch.....
14-inch.....
15-inch.....
16-inch.....
18-inch.....
20-inch.....
24-inch.....
26-inch.....
28-inch.....
30-inch.....
32-inch.....
36-inch.....
40-inch.....
42-inch.....

UNIVERSAL SAFETY CYLINDERS FOR HAND PLANERS AND JOINTERS

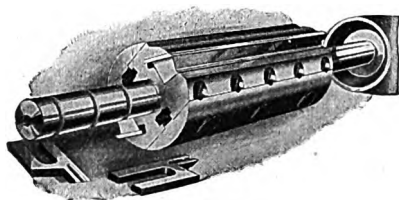


FIG. 1812

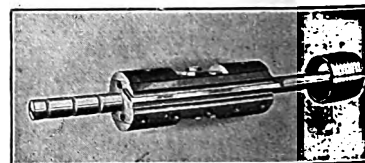


FIG. 1813

These cylinders combine the safety and smooth cutting value of the full circular cylinder with the ability of the square type to carry overswinging cutters. These steel knives are held in place the same as on the regular circular head. Sectional caps make full round and any or all sections are removable when it is desired to clamp a forming cutter in place.

DIRECTIONS FOR ORDERING

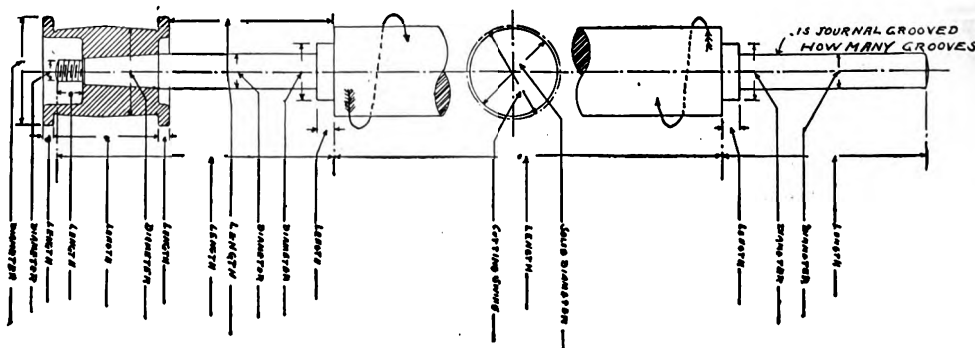


FIG. 1814

Name of Maker of machine _____

Name or Number of machine _____

Diagram for convenience in ordering Safety Circular and Universal Cylinders for machines now equipped with other style
Fill in dimensions indicated by arrow points very carefully.



PLANER KNIVES

NO. 4 HIGH SPEED STEEL
MADE OF HIGH TUNGSTEN STEEL

GUARANTEED NOT TO CHECK, CRUMBLE OR BREAK.



FIG. 5029

Both sides are surface ground insuring uniform thickness. Made from a high tungsten steel scientifically treated and tempered to combine hardness and toughness. Guaranteed to run five hours longer without jointing than any other knife on the market. These knives are used primarily in all round cylinders; on all styles and makes of machines from the smallest to the largest. They can, however, be used on any machine that dresses lumber whether it be a high speed or a slow speed machine and can also be used on machines having square slotted or square bolted cylinders by the use of caps.

In ordering please be careful to see that the knife specified measures $\frac{1}{4}$ inch longer than the length of the cylinder. This is necessary so that in dressing the lumber the full length of the cylinder, the extra length will properly take care of the edges.

STOCK SIZES

Thickness, $\frac{1}{8}$, $\frac{3}{16}$, $\frac{1}{4}$ or $\frac{1}{2}$ inch; width, 2 inches or less, any length.
Prices upon application.

CORRUGATED BACK HIGH SPEED STEEL KNIVES

O. K. NO. 4

These corrugated back high speed steel knives are made from the same high tungsten steel as the regular O. K. No. 4 Knives and can be furnished for all makes of machines using this style of knife in all thicknesses, widths and lengths. Prices upon application.

THICK STEEL PLANER KNIVES

We can furnish any kind of a knife for any kind of a machine or any kind of work, to give the very best possible results relative to temper, uniformity, cutting qualities, finish and length of service.

When ordering knives state number of knives wanted, number of sets, number in set, length, width, thickness, name and make of machine, and kind of wood to be cut. The cutting edge always constitutes the length of the knife. When possible, furnish a pattern. Place the knife face down on the paper, mark round to show the length of the knife, and size and position of the slots, and be sure to state the width and thickness, as shown in diagram; also state the number of knives in set, and the temper required, whether high, to grind only, medium to file slowly, or to file easily. It is well to send an old knife or a pattern showing the holes or the slots. This is particularly true in ordering planer knives, paper knives, barker and chipper knives, etc.



FIG. 1821

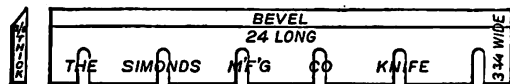


FIG. 1822

BLANKS FOR STICKER KNIVES

BEVELED AND FACED, NOT TEMPERED



FIG. 1825—HAMMERED



FIG. 1826—REGULAR

Stock sizes, thickness $\frac{1}{4}$, $\frac{1}{2}$ and $\frac{3}{8}$ -inch; widths $\frac{1}{2}$, $\frac{5}{8}$, $\frac{3}{4}$, 1, 1 $\frac{1}{4}$, 1 $\frac{1}{2}$, 1 $\frac{3}{4}$, 2, 2 $\frac{1}{4}$, 2 $\frac{1}{2}$, 2 $\frac{3}{4}$ and 3 inches.

Prices upon application.

HOG KNIVES

Our Hog Knives are made from the very best steel specially made with the proper carbon, manganese, sulphur and all the different ingredients to stand this class of work. They are given a special heat-treatment that makes them very tough.

We can furnish Hog Knives for all makes of Hogs on the market.

When ordering give size and the make of machine for which the knives are wanted.

MOULDING KNIVES FOR SHAPER OR STICKER

When ordering Moulding Knives always send pattern and state thickness. $\frac{1}{4}$, $\frac{1}{2}$, and $\frac{3}{8}$ inches thick.
Prices upon application.

TENONING KNIVES

When ordering please send correct pattern and state name and number of machine.

MATCHER BITS SOLID STEEL MILLED FACE

Size of T & G	Width of Cutter, in.
$\frac{1}{8}$	1 to 1 $\frac{1}{4}$
$\frac{1}{4}$	1 $\frac{3}{8}$ to 1 $\frac{5}{8}$
$\frac{3}{8}$	1 $\frac{3}{4}$ to 2 $\frac{1}{4}$
$\frac{1}{2}$	2 $\frac{3}{8}$ to 2 $\frac{3}{4}$
$\frac{3}{4}$	3 to 3 $\frac{1}{2}$

Prices upon application.

MITRE KNIVES AND WOOD TRIMMERS

We can furnish Mitre Knives and Wood Trimmers for all makes of machines. When ordering give size and make of machine for which the knives are ordered.

BEVELED SHAPER KNIFE STEEL FOR MAKING UPRIGHT MOULDER OR SHAPER BITS

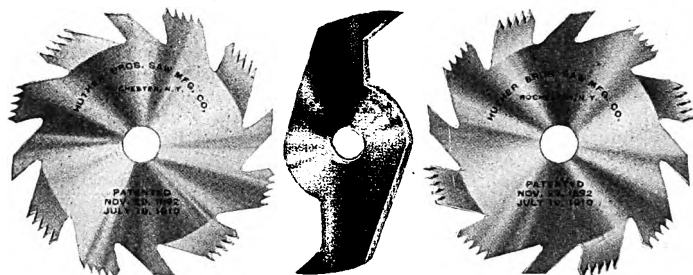


FIG. 1827

Stock sizes, thickness $\frac{1}{4}$ -inch; widths $\frac{3}{8}$, $\frac{1}{2}$, $\frac{5}{8}$, $\frac{3}{4}$, 1, 1 $\frac{1}{4}$, 1 $\frac{1}{2}$, 1 $\frac{3}{4}$ and 2 inches, in bars 30 inches long. Prices upon application.

ADJUSTABLE GROOVING SAWS OR DADO HEADS

HUTHER



OUTSIDE CUTTER

INSIDE CUTTER

OUTSIDE CUTTER

FIG. 1819



SHOWING GROOVES CUT

FIG. 1820

This groover consists of two outside saws, each of which is a groover in itself, and as many inside cutters as required. The inside cutters are made $\frac{1}{8}$, $\frac{1}{4}$ and $\frac{1}{2}$ inch thick, so that any width groove measurable in sixteenths may be cut. The outside cutters are made $\frac{1}{8}$ inch thick.

It will cut a perfect groove, either with or across the grain, and will not leave a rough edge as is the case with ordinary groovers.

This tool is recommended to any person in need of a perfect groover, dado or gaining head.

The outside cutters can be used singly, together, or in connection with as many or as few inside cutters as required to cut the necessary width groove.

PRICE LIST

Diameter.....inches	6	7	8	9	10	11
No. 1 Set.....per set	\$11.60	\$13.60	\$15.20	\$16.70	\$18.30	\$19.50
" 2 "....."	14.10	16.30	18.10	19.80	21.60	23.20
" 3 "....."	17.30	19.70	21.70	23.80	26.00	27.80
" 4 "....."	19.80	22.40	24.60	26.90	29.30	31.50
" 5 "....."	24.80	27.80	30.40	33.10	35.90	38.90
" 6 "....."	29.80	33.20	36.20	39.30	42.50	46.30
" 7 "....."	41.00	45.20	49.00	52.90	56.90	61.50
" 8 "....."	52.20	57.20	61.80	66.50	71.30	76.70
Diameter.....inches	12	14	16	18	20	.....
No. 1 Set.....per set	\$21.70	\$26.60	\$31.60	\$36.60	\$39.60	.....
" 2 "....."	25.90	30.80	35.80	40.80	45.80	.....
" 3 "....."	30.90	36.00	41.00	46.00	51.00	.....
" 4 "....."	35.10	40.00	45.00	50.00	55.00	.....
" 5 "....."	43.50	48.50	53.50	58.50	63.50	.....
" 6 "....."	51.90	57.00	62.00	67.00	72.00	.....
" 7 "....."	68.70	77.80	87.60	95.80	108.00	.....
" 8 "....."	85.50	98.60	113.20	124.60	144.00	.....

Jointed and filed, ready for use. In ordering, please state the number of set, diameter of groover and size of hole wanted. Extra inside cutters can be had at any time.

Groovers are arranged in sets as follows:

No. 1 set cuts $\frac{1}{8}$ to $\frac{3}{8}$ by $\frac{1}{8}$ inch.

No. 4 set cuts $\frac{1}{8}$ to 1 by $\frac{1}{8}$ inch.

No. 7 set cuts $\frac{1}{8}$ to 3 by $\frac{1}{8}$ inch.

No. 2 set cuts $\frac{1}{8}$ to $\frac{5}{8}$ by $\frac{1}{8}$ inch.

No. 5 set cuts $\frac{1}{8}$ to $1\frac{1}{2}$ by $\frac{1}{8}$ inch.

No. 8 set cuts $\frac{1}{8}$ to 4 by $\frac{1}{8}$ inch.

No. 3 set cuts $\frac{1}{8}$ to $\frac{3}{4}$ by $\frac{1}{8}$ inch.

No. 6 set cuts $\frac{1}{8}$ to 2 by $\frac{1}{8}$ inch.

Special sets made to cut from 4 to 8 inches wide

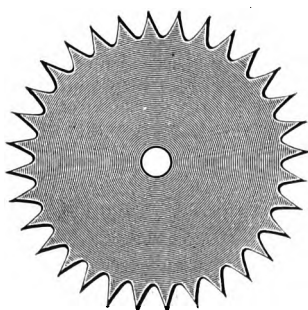


FIG. 1828

FEED SPURS

EXTRA HARD TEMPER. FOR SELF-FEED RIP SAW MACHINE

Spurs 6-inches diameter $\frac{1}{8}$ -inch thick.

Spurs 7-inches diameter $\frac{1}{8}$ -inch thick.

Spurs 8-inches diameter $\frac{1}{8}$ -inch thick.

Other sizes made to order.

Prices upon application.

THE MATTISON EVERLASTING DADO-HEAD

STYLE A

The style shown is the most efficient Head and is strongly recommended where the cutting is hard and difficult, and where the maximum capacity is demanded.

The four spur knives used are more than equal to the task of doing a perfectly clean and smooth job of side cutting in any kind of wood; while the groovers, which, of course, get the most work, are guaranteed to cut faster and cleaner than those of any other head on the market.

The arbor is protected from the set screw which fastens the hub, by a feather or spline fitted flush to the inside of the hole and fastened.

The head is made in the following standard sizes:

No. 2.	Cutting from $\frac{3}{8}$ " to $\frac{7}{8}$ "	No. 5.	Cutting from $\frac{3}{4}$ " to $1\frac{1}{2}$ "
No. 3.	Cutting from $\frac{1}{2}$ " to 1"	No. 6.	Cutting from $\frac{1}{2}$ " to $1\frac{3}{4}$ "
No. 4.	Cutting from $\frac{5}{8}$ " to $1\frac{1}{4}$ "	No. 7.	Cutting from 1" to 2"

If it is desired to increase the range of adjustment on this style head, it can be furnished with an extra or additional set of grooving knives, as for instance, the No. 2 cutting $\frac{3}{8}$ " to $\frac{7}{8}$ " can also be provided with a set of the No. 7 groovers, making it adjustable from $\frac{3}{8}$ " to 2".

Diameter of Cutting Circle, 9"; Length of Hub, $2\frac{1}{2}$ ". In ordering give exact size of arbor to avoid delays. Prices on application.

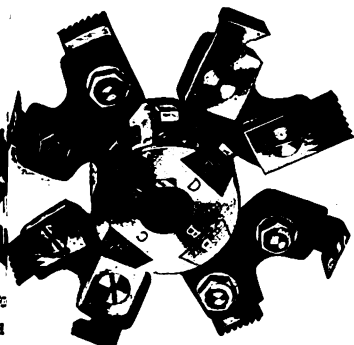


FIG. 1815

PHILBRICK SPECIAL CEILING HEAD SET FOR DOUBLE V JOINT

With these heads you can set up for double V joint ceiling or bull nose, as quickly and accurately as for flooring. By taking off the V joint attachment (requiring less than five minutes) you have a perfect set of flooring heads with high speed cutters. Philbrick Heads are made of forged steel and cutters of "High Speed" and to fit any machine or kind of matching required.

Prices of heads vary according to the style of heads wanted and the range of work required.



FIG. 1816

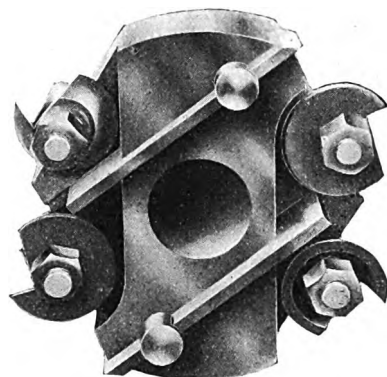
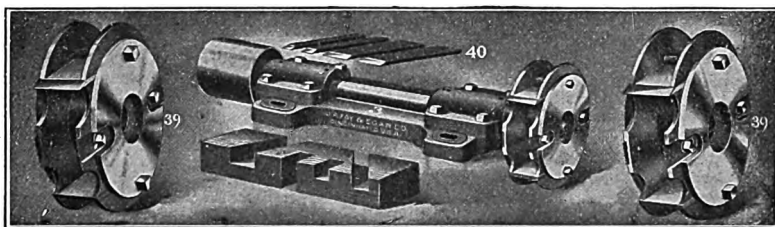


FIG. 1817

BOTTOM VIEW OF SPECIAL CEILING OR PROFILE SIDE HEAD

STEEL-PLATE EXPANSION GAINING HEAD

FAY AND EGAN



APPLIED TO SAW ARBOR—FIG. 1818

These heads are made of steel plates in two sections. The outer faces carry spurs held in milled seats—the inner faces have grooves which the cutters are inserted and held by end pressure. Turned bolts rigidly secure both together. They can be used on saw bars by omitting the outside collar. Three sizes are made as follows:

No. 1—7 $\frac{1}{4}$ -inch diameter, to cut all sizes from $\frac{1}{2}$ inch to 2 inches.....	Price
No. 2—8 $\frac{1}{2}$ -inch diameter, to cut all sizes from $\frac{5}{8}$ inch to 2 inches.....	.....
No. 3—9 $\frac{1}{2}$ -inch diameter, to cut all sizes from $\frac{1}{2}$ inch to 2 inches.....	.....

SOCKET FIRMER CHISELS

BUCK BROTHERS

EXTRA QUALITY CAST STEEL.

LEATHER CAPPED HANDLES.



FIG. 1851

NO. 36 BEVELED EDGES—5½ INCH BLADE

Size, Inches.....	1/8	1/4	3/8	1/2	5/8	3/4	7/8	1	1 1/4	1 1/2	1 3/4	2
Weight per doz., lbs.....	3	3 1/8	4	4 1/4	5	5 1/4	5 3/4	6 1/4	8 1/8	10	11	13
Price per doz.....	\$7.80	8.00	8.30	8.90	9.40	10.10	10.60	11.20	12.80	13.80	16.20	17.90

NO. 36 IN SETS

No. 36A. Set of twelve (one each 1/8, 1/4, 3/8, 1/2, 5/8, 3/4, 7/8, 1, 1 1/4, 1 1/2, 1 3/4 and 2). Weight 8 1/4 lbs. Price per set.....

\$11.30

No. 36G. Set of nine (one each 1/8, 1/4, 3/8, 1/2, 3/4, 1, 1 1/4, 1 1/2 and 2). Weight 5 lbs. Price, per Set.....

\$3.3

NO. 35, PLAIN EDGES—5½ INCH BLADE

Size, Inches.....	1/8	1/4	3/8	1/2	5/8	3/4	7/8	1	1 1/4	1 1/2	1 3/4	2
Weight per doz., lbs.....	2 3/4	3 1/4	4	4 5/8	5 3/8	6	6 1/4	7	9	10 1/8	11 1/2	12 1/2
Price per doz.....	\$5.65	5.85	6.15	6.45	7.05	7.55	8.05	8.65	9.45	10.25	11.45	12.6

NO. 35 IN SETS

No. 35A. Set of twelve (one each 1/8, 1/4, 3/8, 1/2, 5/8, 3/4, 7/8, 1, 1 1/4, 1 1/2, 1 3/4, and 2). Weight 8 1/4 lbs. Price, per set.....

\$7.75

No. 35G. Set of nine (one each 1/8, 1/4, 3/8, 1/2, 3/4, 1, 1 1/4, 1 1/2 and 2). Weight 5 lbs. Price, per set.....

\$5.5

HANDLED BUTT NO. 4, BEVELED EDGES

9 INCHES OVER ALL

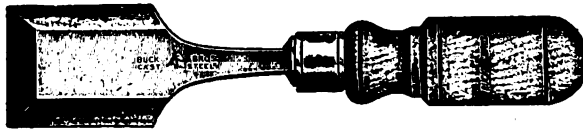


FIG. 1852

Ground Sharp and Honed.

Brass Ferrule.

Size, Inches.....	1	1 1/4	1 1/2	1 3/4	2
Weight, per doz.....	3 3/4	4 1/2	5 1/4	6 1/4	6 3/4
Price, per doz.....	\$8.00	10.50	11.90	14.80	16.7

SOCKET FIRMER GOUGES

BUCK BROTHERS

MADE OF EXTRA QUALITY STEEL WITH LEATHER CAPPED HANDLES.



NO. 42—FIG. 1853

NO. 41 BEVELED INSIDE. 6-INCH BLADE

Size, Inches.....	1/8	1/4	3/8	1/2	5/8	3/4	7/8	1	1 1/4	1 1/2	1 3/4	2
Weight per doz., lbs.....	1 1/4	2 1/4	3 3/8	4 1/2	5 3/4	7 1/4	7 3/4	8 1/4	9 1/4	10 1/4	11 1/4	12 1/4
Price, per doz.....	\$7.80	8.40	8.90	9.50	10.00	10.90	12.00	12.60	14.00	15.0		

NO. 42 BEVELED OUTSIDE. 5½-INCH BLADE

Size, Inches.....	1/8	1/4	3/8	1/2	5/8	3/4	7/8	1	1 1/4	1 1/2	1 3/4	2
Weight per doz., lbs.....	1 1/4	2 1/4	3 3/8	4 1/2	5 3/4	7 1/4	7 3/4	8 1/4	9 1/4	10 1/4	11 1/4	12 1/4
Price, per doz.....	\$6.50	7.00	7.50	7.90	8.10	9.00	9.80	10.50	11.70	12.90	14.30	15.1

NOS. 41 & 42 IN SETS

BEVELED INSIDE

No. 41A. Set of twelve (one each 1/8, 1/4, 3/8, 1/2, 5/8, 3/4, 7/8, 1, 1 1/4, 1 1/2, 1 3/4 and 2). Price, per set.....

\$12.30

No. 41G. Set of nine (one each 1/8, 1/4, 3/8, 1/2, 3/4, 1, 1 1/4, 1 1/2, and 2). Price, per set.....

\$9.05

BEVELED OUTSIDE

No. 42A. Set of twelve (one each 1/8, 1/4, 3/8, 1/2, 5/8, 3/4, 7/8, 1, 1 1/4, 1 1/2, 1 3/4 and 2). Price, per set.....

\$10.5

No. 42G. Set of nine (one each 1/8, 1/4, 3/8, 1/2, 3/4, 1, 1 1/4, 1 1/2, and 2). Price, per set.....

\$7.4

Supplied with leather capped hickory handle at \$0.75 per dozen or set.

P. S. & W. CHISELS

P. S. & W. Chisels are made of special Crucible Steel and Norway Iron, and are tempered and hardened by a special process. All Chisels are sharpened before leaving the factory so that with very little honing they can be given a sharp cutting-edge. The sockets are made of Best Norway Iron, are long, deep and of uniform thickness and strength, perfectly rounded and fitting the handle properly.



FIG. 1854

SOCKET FIRMER CHISELS

NO. 11 BEVELED EDGES

With Leather Capped Handles. Blades from 6 to 7 inches in length.

PRICE LIST

Size, Inches.....	$\frac{1}{8}$	$\frac{1}{4}$	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{5}{8}$	$\frac{3}{4}$	$\frac{7}{8}$
Weight per dozen, pounds.....	3 $\frac{1}{2}$	4	4 $\frac{1}{4}$	4 $\frac{1}{2}$	5	6 $\frac{1}{2}$	7 $\frac{1}{2}$
Price per dozen.....	\$14.00	14.00	14.00	14.00	14.00	15.50	16.00
Size, Inches.....	1	1 $\frac{1}{8}$	1 $\frac{1}{4}$	1 $\frac{3}{8}$	1 $\frac{1}{2}$	1 $\frac{5}{8}$	1 $\frac{3}{4}$
Weight per dozen, pounds.....	8	9	10 $\frac{1}{2}$	11	12	13	14
Price per dozen.....	\$18.50	20.50	20.50	22.00	22.00	24.00	24.00
Size, Inches.....	2	2 $\frac{1}{8}$	2 $\frac{1}{4}$	2 $\frac{3}{8}$	2 $\frac{1}{2}$	2 $\frac{5}{8}$	2 $\frac{3}{4}$
Weight per dozen, pounds.....	15	16	17	18	19	20	21
Price per dozen.....	\$25.00	26.00	27.00	28.00	29.00	30.00	31.00

SOCKET CABINET CHISELS

NO. 111 BEVELED EDGES

With Leather Capped Handles. Blade 3 $\frac{1}{2}$ inches in length.

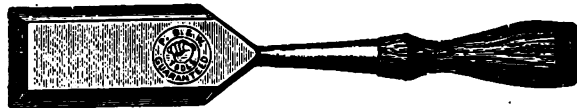


FIG. 1855

Size, Inches.....	$\frac{1}{8}$	$\frac{1}{4}$	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{5}{8}$	$\frac{3}{4}$	$\frac{7}{8}$	1	1 $\frac{1}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	2
Price per dozen.....	\$14.00	14.00	14.00	14.00	15.50	16.00	18.00	18.50	20.50	22.00	24.00	25.00

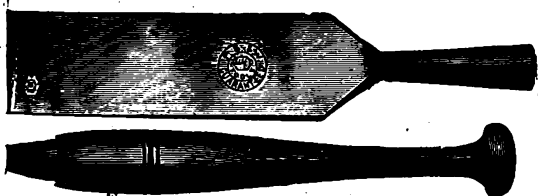


FIG. 1856

CARPENTERS SLICKS

NO. 12

LENGTH OF BLADE 10 INCHES

Size, Inches.....	2 $\frac{1}{4}$	2 $\frac{1}{2}$	2 $\frac{3}{4}$	3	3 $\frac{1}{4}$	3 $\frac{1}{2}$	4
Weight per doz. lbs.	41	45	49	54	57	60	72
Price per dozen...	\$50.25	50.25	57.00	57.00	68.25	68.25	79.50

Can also be furnished with Beveled Back if so ordered at additional price.

SETS OF CHISELS

WITH LEATHER CAPPED HANDLES

NO. 132

This Set of P. S. & W. Socket Firmer Chisels is put up in an open box fitted with Improved Springs and Hinged Cover. The set contains twelve chisels, one each, $\frac{1}{8}$, $\frac{1}{4}$, $\frac{3}{8}$, $\frac{1}{2}$, $\frac{5}{8}$, $\frac{3}{4}$, $\frac{7}{8}$, 1, 1 $\frac{1}{4}$, 1 $\frac{1}{2}$, 1 $\frac{3}{4}$ and 2 inches. Mirror Polished and Bevel Edges. Weight 10 pounds. Price per Set..... \$12.50

HATCHETS

Forged from the highest grade of Crucible Steel, carefully hardened and tempered, so as to combine extreme toughness with maximum hardness. The handles are made of selected second-growth hickory, thoroughly air-seasoned, securely wedged in the head and guaranteed to stay. They are shaped to fit the hand and perfectly balanced.

PRICE LIST CLAW HATCHETS

No.	Cut Inches	Weight Dozen	Price Dozen
1	3 $\frac{1}{2}$	24 lbs.	\$18.00
2	4	26 lbs.	19.00
3	4 $\frac{1}{2}$	30 lbs.	20.00

BROAD HATCHETS—SINGLE BEVEL

1	4	27 lbs.	\$21.00
2	4 $\frac{1}{2}$	28 lbs.	23.00
3	5	35 lbs.	26.00
4	5 $\frac{1}{2}$	38 lbs.	29.00
5	6	44 lbs.	33.00
6	6 $\frac{1}{2}$	50 lbs.	38.00

BROAD HATCHETS—DOUBLE BEVEL

11	4	27 lbs.	\$21.00
12	4 $\frac{1}{4}$	32 lbs.	23.00
13	4 $\frac{3}{4}$	33 lbs.	26.00
14	5 $\frac{1}{4}$	37 lbs.	29.00
15	5 $\frac{3}{4}$	40 lbs.	33.00



STYLE C-BOX
FIG. 1857

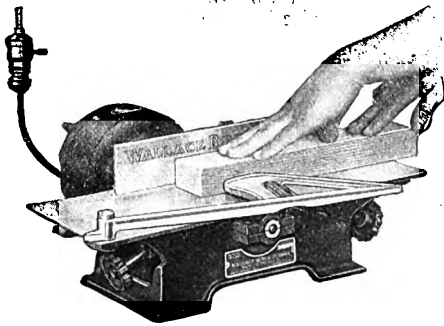


FIG. 1858—CLAW



FIG. 1859—BROAD

WALLACE BENCH JOINTERS



FOUR-INCH JOINTER—FIG. 5023

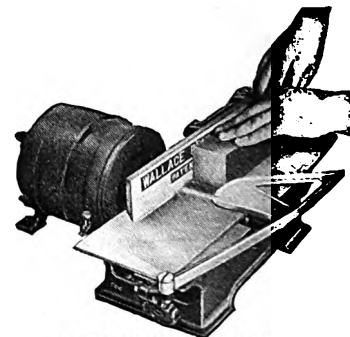
Most of the fitting, jointing, trimming and surfacing now done in the average shop can be done on these small machines, before a man could get started with a hand plane or within the time wasted going to and from a stationary jointer. Wallace Planers are portable and operate from their own motor on any electric light circuit. You simply snap the switch and in a few seconds the deepest cut or a beautiful finish cut has been completed. Once over with these machines gives a perfect surface. No dressing required. The cutter head is the circular safety type made in one piece of high-grade steel. A two-knife head is furnished with D. C. Motor drive but since 3600 R.P.M. is the highest speed obtainable with A. C. motors a three-knife head is provided for this type. The tables are adjustable to any depth of cut. The fence is adjustable to any angle. Power is applied at 100 per cent efficiency by the General Electric Motor made especially for the Wallace Jointers connected directly to the cutter head with a flexible leather coupling. When electric current is not available these machines can be supplied with pulley and countershaft for drive from line shaft.

A FEW SPECIAL FEATURES

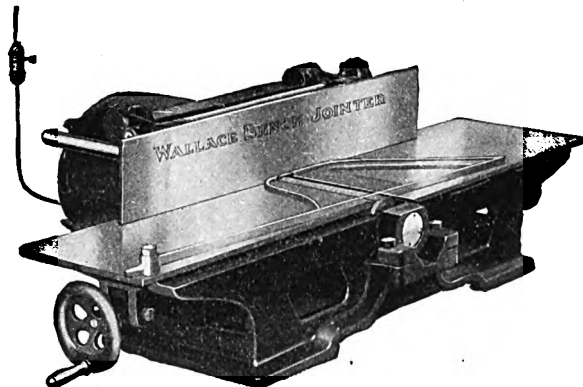
- 1—Flap and Shutter guard protects operator at all times.
- 2—Sliding Fence quickly adjusted for a cut at any angle permits very accurate work.
- 3—General Electric Motor, either alternating or direct current, gives ample power.
- 4—Cutterhead easily taken out and replaced by special heads in a few seconds.
- 5—Tables slide backward and forward independent of raising or lowering movement; permits use of special heads.
- 6—Handscrews adjust tables quickly to any depth cut desired up to $\frac{1}{2}$ inch.
- 7—Equipped with ball bearings throughout—saves power and prolongs life.

THE FLAP AND SHUTTER SAFETY GUARD

All four and six-inch Jointers are fitted with the Flap and Shutter Guard. The Flap (A) is an aluminum casting swinging laterally over the tables; it covers exposed part of knives when narrow stock is planed and is held against stock by spring (B). The Shutter (C) is part of a steel tube which rotates in grooves cut in the frame, concentric with cutter head and covers the throat-opening; it opens as stock goes through. Spring (D) snaps shutter back over knives when cut is finished. The knives are entirely covered all the time; any kick-back of the stock "shuts the shutter."



SAFETY GUARD—FIG. 5024



SIX-INCH JOINTER—FIG. 5025

FOUR-INCH JOINTER

This machine will handle all work up to four feet long by four inches wide and give a smooth finish surface on hard as well as soft wood. Longer stock can be worked by use of roller rests. The table is adjustable to any depth of cut and the fence to any angle. Ample power is supplied by an electric motor directly connected to the cutter head by a flexible leather coupling; operates on the electric light circuit and starts with the turn of a button.

SIX-INCH JOINTER

Will take any stock from the smallest pieces up to large pieces six inches wide and six to eight feet long. Longer stock can be worked by the use of roller rests. Handles the hardest woods with ease.

SPECIFICATIONS

	4-Inch Jointer	6-Inch Jointer
Length of cutting knives, inches.....	4	6
Length of front table, inches.....	10	15
Length of rear table, inches.....	9	15
Length of jointer, over all, inches.....	19	31 $\frac{1}{2}$
Electric Motor, horsepower.....	$\frac{1}{4}$	$\frac{1}{2}$
With A. C. Motor, speed of cutter head R. P. M.....	3600	3600
With D. C. Motor, speed of cutter head R. P. M.....	4000	4000
Weight of Jointer (with motor).....	50	150
Price with c/s and pulley.....	.....	.....
Price with A. C. Motor.....	.....	.....
Price with D. C. Motor.....	.....	.....

When ordering give current and voltage; if A. C. state cycle and phase.

PLANES

BAILEY ADJUSTABLE IRON

Handle and knob made of highly finished, thoroughly seasoned rosewood. Cutter adjustable endwise by means of the adjusting wheel at the back of the frog. Also adjustable sidewise by lever located near the top and at the back of the cutter.

The Planes described below generally known as Bench Planes, are divided into four classes, viz: SMOOTH, JACK, FORE, and JOINTER.

A SMOOTH PLANE is for finishing or smoothing off flat surfaces. Where the uneven spots are of slight area, its short length will permit it to locate these irregularities, leaving the work with a smooth surface when finished.

A JACK PLANE is used to true up the edges of a board in the rough and prepare it for the Fore or Jointer.

A JOINTER is a finishing Plane for large surfaces and is invariably used to true up the edges of boards so that they can be closely fitted or joined together.

Planes with bottoms either flat or corrugated furnished as desired. The number with a "C" designates Corrugated Bottom.



NOS. 1 TO 4½—FIG. 1860



NOS. 5 TO 8—FIG. 1861

PRICE LIST

Style	Smooth					Jack		Fore	Jointer	
Number	1	2	3 or 3C	4 or 4C	4½ or 4½C	5 or 5C	5½ or 5½C	6 or 6C	7 or 7C	8 or 8C
Length, inches....	5½	7	8	9	10	14	15	18	22	24
Width of Cutter, in.	1¼	1½	1¾	2	2½	2	2¼	2½	2¾	2½
Weight, each, lbs...	1¼	2¼	3½	3¾	4¾	4¾	6¾	7¾	8½	9¾
Flat Price, each...	\$3.55	4.60	4.80	5.25	6.05	6.05	6.75	7.90	8.80	10.50
Corrugated, each...	.....	.....	\$5.15	5.60	6.50	6.50	7.30	8.30	9.45	11.30

BAILEY WOOD BOTTOM

Every carpenter needs two or more wood planes in his kit, for rough outside work. "Bailey" Wood Planes supply the demand for a wood plane of superior quality. The bottom, handle, and knob are made from selected and well seasoned beech. The cutters are the regular "Bailey" Type and are adjustable both endwise and sidewise.

The frog is held in place by two machine screws which pass through the top iron and screw into two brass lugs. These lugs are screwed and securely pinned into the wood bottom. This is far superior to other methods of fastening, as it holds together firmly the wood bottom, the top iron which strengthens the wood bottom, and the frog.

FIG. 1862

PRICE LIST

Style	Smooth, without Handle		Block	Jack	
Number	22	24	25	26	27½
Length, inches....	8	8	9½	15	15
Width of Cutter, inches....	1¾	2	1¾	2	2¼
Weight each, pounds....	2½	2½	2½	3¾	4¾
Price, each....	\$3.30	3.45	3.30	3.60	4.15

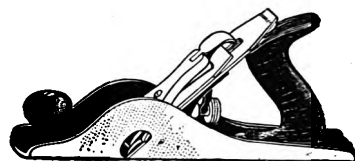
Style	Fore	Jointer		Smooth Handled		Jenny Smooth
Number	28	31	32	35	36	37
Length, inches....	18	24	26	9	10	13
Width of Cutter, inches....	2¾	2¾	2¾	2	2¾	2½
Weight each, pounds....	5½	6½	7½	3¼	4	5
Price, each....	\$4.55	4.85	5.25	4.05	4.55	5.00

CARRIAGEMAKERS RABBET PLANES

These Planes are especially adapted for the heavy framing required in mining work, for carriage or wagon building, or in any work of similar nature. They are constructed along the lines of the Bailey Plane, having a cutter of the double type and being adjustable both endwise and sidewise. Handles and Knobs are made of highly finished, thoroughly seasoned rosewood. Nos. 10 and 10½ differ only as to length.

The No. 10½ Plane not only has all the features of the Nos. 10 and 10½ but in addition both the handle and knob can be tilted to either side. This permits of the Plane being worked with ease close up to perpendicular sides of any height without hurting the hands of the user. It is also fitted with spurs on both sides, so that it will rabbet across the grain equally as well as with it.

These planes have flat bottoms.



NO. 10—FIG. 1863

PRICE LIST

Number	10½	10	10¼
Length, inches.....	9	13	13
Width of Cutter, inches.....	2½	2½	2½
Weight each, lbs.....	3	4¼	4¼
Price, each.....	\$5.00	6.00	7.00

WOOD BASE BORING MACHINE

A standard tool with carpenters for many years. For house framing and boring railroad ties and other large sized boring where speed and large capacity are essential. Bores vertically or at any angle from the vertical within an arc of 50°.

The depth of the bore is regulated by a stop. Auger removed from hole by pushing the cranks to the left and continuing their revolution in same direction as when boring. The frame locks automatically at topmost point in suspension and is released by pressure upon thumb latch. Has adjustable cranks to regulate speed and power.

Wood bottom board. Spindle, cranks, upright, and angle rods made of steel. Steel and machined parts polished. Other metal parts japanned. Handles of stained hardwood.

Machine regularly made to bore to depth of 12 in., but made to order for greater depths at small additional charge. Height, 25 in. Weight, boxed, 45 lbs.; net, 28 lbs.

Packed one in a wooden box. Price, without augers, \$21.15

Augers in sets....	18	23	41 quarters
Sizes.....	1, 1½, 2 in.	1, 1¼, 1½, 2 in.	½, ⅝, ¾, ⅞, 1, 1¼, 1½, 1¾, 2 in.
Price, per set....	\$6.00	7.50	13.50

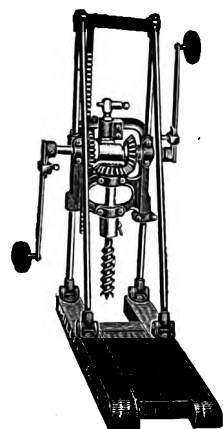


FIG. 1836

STEEL BASE BORING MACHINE

This number is similar to Fig. 1836 except it has a base of japanned steel that prevents warping.

The depth of the bore is regulated by a stop. Auger removed from hole by pushing the cranks to the left and continuing their revolution in same direction as when boring. The frame locks automatically at topmost point in suspension and is released by pressure upon thumb latch. Has adjustable cranks to regulate speed and power.

Spindle, cranks, upright and angle rods made of steel. Steel and machined parts polished. Other metal parts japanned. Handles of stained hardwood.

Machine regularly made to bore to depth of 12 in., but made to order for greater depths at small additional charge.

Height, 25½ in. Weight, boxed, 49 lbs.; net, 31 lbs.

Price, without augers, \$22.10

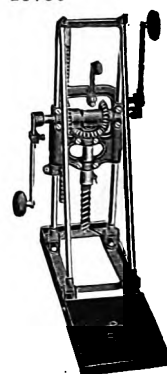


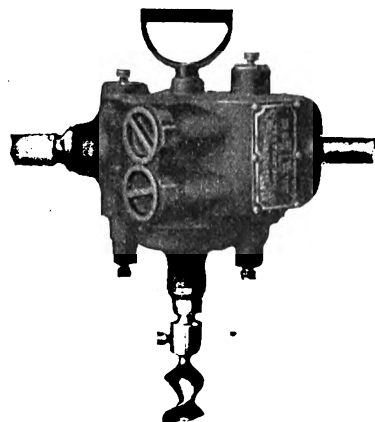
FIG. 1837

PNEUMATIC REVERSIBLE WOOD BORING MACHINES

CAPACITIES: 1, 2, AND 4 INCHES DIAMETER

Straight shank drills 0 to ⅜ inch. Taper shank drills and reamers ½ inch and larger—wood bits and Morse Taper Sleeves for these tools furnished from stock.

Prices upon application.



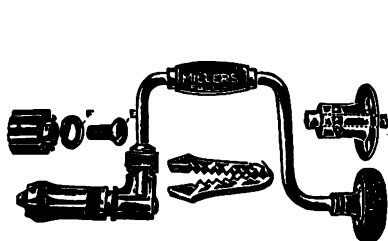
REVERSIBLE TYPE—FIG. 1839



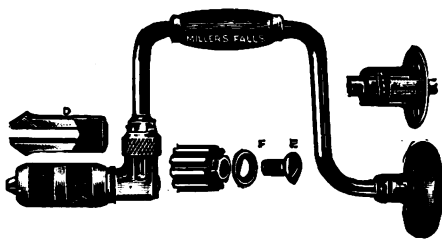
FIG. 1838

RATCHET BRACES

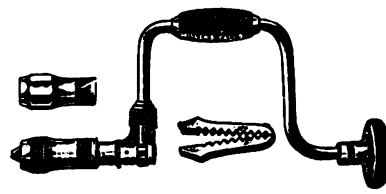
MILLERS FALLS



NOS. 30 TO 34
FIG. 5031



NOS. 730 TO 734
FIG. 1830



NOS. 1320 TO 1324
FIG. 1831

BARBER

NOS. 30 TO 34

Polished and nicked steel. Ball-bearing head. Handle with inserted steel rings and adjustable bearings clamped with screws. Covered ratchet teeth with exposed ratchet dogs. Patent cup washer and screw to hold chuck to sweep without working loose. Forged steel alligator jaws holding bit stock and many sizes of round and irregular shanks.

HOLDALL

NOS. 729 TO 734

The brace illustrated above is one of the most popular on the market, because so many mechanics and amateurs believe that for all ordinary work it answers every requirement of a high grade brace which it is.

It has a ball-bearing head which greatly decreases friction and adds to the boring power. The Holdall chuck on this brace has same patent milled forged steel jaws that hold bitstock shanks, straight shank drills from $\frac{1}{8}$ to $\frac{1}{2}$ inch in diameter and No. 1 Morse taper shanks.

While two jaw chucks are primarily for bitstock shanks carpenters who have used this chuck with round shank drills in the most difficult work have always found that it holds with viselike grip.

The chuck body is made of solid bar steel. The shell is specially designed for strength.

BARBER

NOS. 1320 TO 1324

This medium-priced ratchet brace is of polished and nicked steel, ebonized head and handle and a friction washer under the head to minimize friction at that point instead of ball-bearings; head is steel clad.

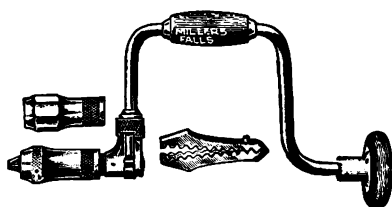
PRICE LIST

Size of Sweep Inches	Nos.	Weight Dozen Pounds	Price Each	Nos.	Weight Dozen Pounds	Price Each	Nos.	Weight Dozen Pounds	Price Each with Steel Clad Heads
14	30	45	\$4.45	730	51	\$4.85	1321	36	\$3.35
12	31	39	4.25	731	44 $\frac{1}{4}$	4.65	1322	33 $\frac{1}{2}$	3.20
10	32	37	4.10	732	42	4.50	1323	29 $\frac{1}{2}$	3.10
8	33	33	3.95	733	37 $\frac{1}{2}$	4.40	....	....	....
6	34	30	3.95	734	35	4.40	....	....	....

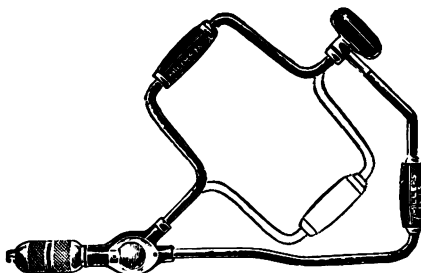
Any of these numbers supplied with octagonal chuck shells at ten cents extra each.

BRACES

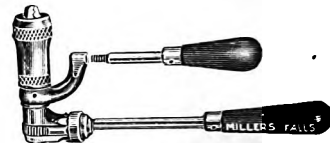
MILLERS FALLS



NOS. 421 TO 423
FIG. 1832



NOS. 502 AND 503
FIG. 1833



NO. 140
FIG. 1834

RATCHET BRACE

(MOHAWK) NOS. 421 TO 423

For those who want an inexpensive, nickeled ratchet brace this is a popular style. The jaws are cast, not forged, of the alligator pattern. Ratchet is of open type and head has a plain bearing. Head is screwed on and further held on with two wood screws.

CORNER BIT BRACE

NOS. 502 AND 503

A standard tool for corner boring which permits of effective pressure directly in line with the chuck. Made of the same material as the best bit braces. Ball-bearing head, ball thrust bearing at the base of the chuck, and free-acting sweep and steadying-handles. Native stained hardwood head and handles and nickel-plated finish throughout except on japanned hub casting.

Chuck is turned by inclosed gears which are accessible when desired. The gears are casehardened. Hardened steel bushings at chuck spindle and sweep practically eliminate wear at the bearings. Master chuck takes bitstock or straight shanks or No. 1 Morse taper shanks.

RATCHET CORNER BORER

NO. 140

For corner boring in wood where the space is very cramped. Has Barber chuck with alligator jaws for bitstock shanks. Width of tool without bit 5 in. Ratchet has fine teeth to admit short bite. Steadying handle removable. Metal parts nickeled. Stained hardwood handles.

PRICE LIST

Number	Size of Sweep, Inches	Length Inches	Weight Pounds Dozen	Price Each
140	..	....	28	\$4.20
*421	12	....	34	2.80
*422	10	....	31½	2.75
*423	8	....	27½	2.70
502	10	17½	57	6.75
503	8	17½	55	6.35

*Furnished with octagonal chuck shells at fifty cents per dozen.

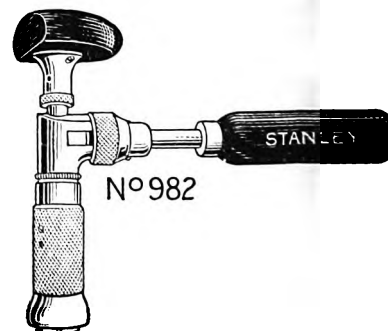
STANLEY CORNER RATCHET BIT BRACES

NOS. 982 AND 984

This style of Ratchet Bit Brace is designed particularly for Electricians, Plumbers and Gas Fitters, but many other Mechanics who have occasion to work close up into corners, or in other inaccessible places, find it a very useful tool. The knurled ring between the head and the ratchet mechanism, operated with the thumb and finger of the hand holding the head, is for the purpose of starting and holding the bit until it is far enough in the wood so that it will not reverse when the handle is turned back.

Both numbers are alike in all respects except as to jaws, No. 982 having the Interlocking, and No. 984, the Alligator Type. Both styles of jaws are drop forgings, machined and have springs for automatic release. The peculiar shape of the head enables the user to place the Brace close up to horizontal or perpendicular surfaces, a distinct advantage over the old form of head. All metal parts nickel-plated.

No. 982. Interlocking Jaws, Cocobolo Head and Handle, Price Each \$4.15
No. 984. Alligator Jaws, Cocobolo Head and Handle, Price Each 3.80



No. 982

FIG. 1835

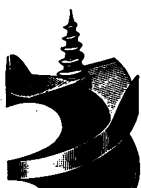
RUSSELL JENNINGS EXTENSION LIP AUGER BITS

STANDARD NO. 100

FIG. 1840
DOUBLE THREAD SCREW

FIG. 1841

This is the standard bit for use with hand brace. Crucible Cast Steel, Polished, Double Thread Screw—for use when boring through Veneer, Pattern work and Cabinet work. For Quick-Boring and use in gummy woods use the "Quick-Boring" Bit Fig. 1843.

FIG. 1842
SINGLE THREAD SCREW

QUICK BORING NO. 101



FIG. 1843

This Bit is exactly like the Standard Bit Fig. 1841, except for the coarse single thread on the point for rapid boring. For ordinary work in soft wood. Especially suited for use in gummy woods, end-grain boring, mortising doors, etc.

PRICE LIST OF STANDARD AND QUICK-BORING AUGER BITS

es by 16ths.....	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
ice per dozen.....	\$6.00	5.00	5.00	5.00	5.00	5.00	6.00	6.00	7.00	7.00	8.25	8.25	9.50	9.50	12.00	12.00

Larger Sizes upon application.

IN HARDWOOD BOXES AND CANVAS ROLLS**STANDARD SET OF 32 1/2 QUARTERS**

This set will be packed in three section hardwood box unless otherwise specified. Canvas Roll, especially designed for this set, will be furnished in place of the box on request. This Set consists of 13 Bits (one each 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15 and 16 Sixteenths.) Price per Set..... \$8.50

SMALLER SETS

Smaller Sets are packed either in a two section hardwood box or in a canvas roll.

22 1/2 Quarters: This set consists of eleven bits; nine of them having standard double thread (one each 4, 5, 6, 7, 8, 9, 10, 11, 12 Sixteenths) and the other two (one each 8 and 10 Sixteenths) the sizes generally used for mortising doors having quick-thread. Price per Set..... \$6.80

20 1/2 Quarters: This set consists of nine bits (one each 4, 5, 6, 7, 8, 10, 12, 14 and 16 Sixteenths) and gives a range of sizes 1 1/4 inch to 1 inch by eighths, with 1 1/8 and 7/8 added. Price per Set..... 5.90

18 Quarters: This set consists of nine bits (one each 4, 5, 6, 7, 8, 9, 10, 11 and 12 Sixteenths) and gives a full range of sizes 1 1/4 inch to 3/4 inch by Sixteenths. Price per Set..... 5.50

17 1/2 Quarters: This set consists of seven bits (one each 4, 6, 8, 10, 12, 14 and 16 Sixteenths) and gives a range of sizes 1 1/4 inch to 1 inch by eighths. Price per Set..... 4.75

The Quick-Boring Single Thread Bit will be furnished in place of the Standard Double Thread Bit in any of the above sets, specified.

CLARK EXPANSIVE BITS

Small Size: With two cutters, one boring from 1/2 to 3/8 inch and the other from 3/8 to 1 1/2-inch. Price per dozen....\$18.00

Large Size: With two cutters, one boring from 3/8 to 1 3/4 inches and the other from 1 3/4 inches to 3 inches. Price per doz...\$26.00

PRICE LIST OF EXTRA CUTTERS

These Cutters are interchangeable and will fit any of the above bits.

Cutter No.	For Boring Holes, Inches	Price Per Dozen
1	1/2 to 3/8	\$ 3.00
2	3/8 to 1 1/2	3.75
3	3/8 to 1 3/4	5.25
4	1 3/4 to 3	6.00
5	3 to 4	9.00
6	4 to 5	12.00

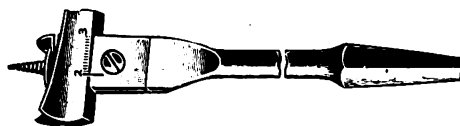


FIG. 1845

HOLLOW CHISELS AND AUGERS

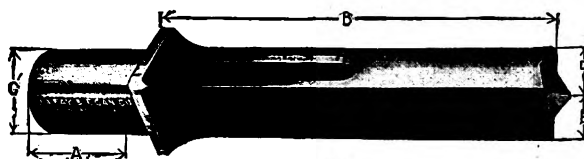


FIG. 1849

SCALE FOR ORDERING CHISELS

Diameter shank—C'.
Length shank—A'.

From shoulder to cutting edge—B'.
Length of two adjacent edges, D' and E'.



FIG. 1850

SCALE FOR ORDERING AUGERS

Diameter shank—C.
Length shank—A.

From shoulder to cutting edge—B.
Diameter of bit—D.

Only expert labor is employed and the finest tool steel is used in the manufacture of these chisels and augers. A system of thorough tests and careful inspection of every tool which we make insures against faulty and defective workmanship.

Great care should be exercised in sharpening hollow chisels if you expect to get the most satisfactory results. Our experience is that they cannot be correctly sharpened by grinding and we therefore recommend the use of the hand file only. Under no circumstances try to sharpen a chisel on the outside.

A bit well filed will be reduced in diameter only from natural wear. When its diameter wears much smaller than the chisel diameter it is no longer serviceable.

In ordering, specify diameter and length of shank, also diameter and length of blade to the shoulder. Give the size and name of machine in which the chisels or augers are to be used. The drawings and schedules above will assist you in ordering.

PRICE LIST

HOLLOW CHISELS FOR ANY MACHINE						HOLLOW CHISEL AUGERS					
4" Blade	Price	6 1/2" Blade	Price	8" Blade	Price	Size Auger 4" Chisel	Price	Size Auger 6 1/2" Chisel	Price	Size Auger 8" Chisel	Price
1/4" x 1/4"	3/8"	....			1/4"	....	3/8"	....	
1/4" x 5/16"	1/2"	....			5/16"	....	1/2"	....	
5/16" x 5/16"	5/8"	....			3/8"	....	5/8"	....	
3/8" x 3/8"	1 1/8"	....			1/2"	....	1 1/8"	....	
3/8" x 1/2"	1 1/4"	....			5/8"	....	1 1/4"	....	
1/2" x 1/2"	1 3/8"	....			3/4"	....	1 3/8"	....	
1/2" x 5/8"	1 1/2"	....			7/8"	....	1 1/2"	....	
5/8" x 5/8"	1 5/8"	....			1"	....	1 5/8"	....	
5/8" x 3/4"	1 3/4"	....			1 1/8"	....	1 3/4"	....	
3/4" x 3/4"	1 7/8"	....			1 1/4"	....	1 7/8"	....	
3/4" x 7/8"	2"	....			1 1/2"	....	2"	....	
7/8" x 7/8"	2 1/8"	....			1 3/4"	....	2 1/8"	....	
7/8" x 1"	2 1/4"	....			1 7/8"	....	2 1/4"	....	
1" x 1"	2 3/8"	....			2"	....	2 3/8"	....	
1" x 1 1/8"	2 1/2"	....			2 1/8"	....	2 1/2"	....	
1 1/8" x 1 1/8"	2 3/4"	....			2 1/4"	....	2 3/4"	....	
1 1/4" x 1 1/4"	2 7/8"	....			2 3/8"	....	2 7/8"	....	
1 1/2" x 1 1/2"	3"	....			2 1/2"	....	3"	....	
1 3/4" x 1 3/4"					2 3/4"	....			
2" x 2"					3"	....			

LENGTH OF BLADE USED ON FAY AND EGAN MACHINES

Nos. 272 and 384 take 4", all sizes.

Nos. 144 and 379 take 4" up to 1 1/8", 6 1/2" over 1 1/8".

Nos. 3, 350 and 365 take 6 1/2" up to 1", 8" over 1".

RECIPROCATING MORTISER CHISELS

Made of highest grade material, and carefully ground to shape and tempered.

Made in three types—common sash and door, agricultural and hub, and car mortising. In ordering, specify which style you want, the width, and be sure to give the shank dimensions, as illustrated in drawing. Better still, send an old chisel as a sample so that the shank will be sure to fit your machine.

SHIP AUGERS (FORD)**MILLERS FALLS****NO. 912 REGULAR LENGTH WITH SCREW — NO. 812 WITHOUT SCREW****NO. 912. FIG. 1847****NO. 812. FIG. 1848**

Ford Ship Augers are famous in shipyards and wherever deep boring is done. Their pre-eminence in this field is the most striking kind of proof of the extreme care given to every detail of their manufacture. Their keen cutting edge, sharp side lip, and deep, clean cut screw, insure the maximum of cutting power with the minimum of driving power. Automatically sized heads insure uniform accuracy, and the Ford open twist positively prevents chip clogging.

Except for the screw, these two ship augers are identical. They vary in length according to their diameter sizes; $\frac{1}{16}$, $\frac{5}{16}$, and $\frac{3}{8}$ inch have 8 inch twist and are 13 inches overall; $\frac{7}{8}$ and $\frac{1}{2}$ inch have 1-inch twist and are 15 inches overall; $\frac{9}{16}$ to $\frac{11}{16}$ inch have 12-inch twist and are 18 inches overall; while the larger augers have 15 inch twist and are 20 inches overall. The no-screw auger will not drift off with the grain and is therefore recommended where absolutely straight boring is necessary. This auger is also more satisfactory for boring in very knotty woods.

Polished twist furnished up to and including $\frac{20}{16}$ inch unless black hollow is specified.

PRICE LIST—PER DOZEN

Sizes by 16ths.	No. 912	No. 812	Sizes by 16ths.	Extra Large with Screws
4 to 10	\$11.00	\$13.20	33 & 34	\$ 57.00
11 & 12	12.00	14.40	35 & 36	72.00
13 & 14	13.00	15.60	37 & 38	86.00
15 & 16	14.50	17.40	39 & 40	101.00
17 & 18	16.00	19.20	41 & 42	115.00
19 & 20	18.00	21.60	43 & 44	130.00
21 & 22	20.00	24.00	45 & 46	144.00
23 & 24	23.00	27.60	47 & 48	158.00
25 & 26	27.00	32.40	49 & 50	173.00
27 & 28	32.00	38.40	51 & 52	187.00
29 & 30	38.00	45.60	53 & 54	201.00
31 & 32	45.00	54.00	55 & 56	216.00

For extra large ship augers without screws, add twenty-per cent to price of similar size with screw.

EXTENSION LIP MACHINE BITS**RUSSELL JENNINGS**

Extra Quality Crucible Cast Steel, Full Polished.

List Price of intermediate sizes the same as the next regular larger.

When ordering Machine Bits, always state length of twist & diameter of shank.

**FIG. 1846****PRICE LIST—PER DOZEN**

Length of Twist Inches				Length of Twist Inches			
by 16ths.	6	12	16	Sizes by 16ths.	6	12	16
3	\$10.80	\$17.28	\$21.60	18	\$22.80	\$36.48	\$45.60
4	10.80	17.28	21.60	19	24.00	38.40	48.00
5	10.80	17.28	21.60	20	25.20	40.32	50.40
6	10.80	17.28	21.60	21	26.40	42.24	52.80
7	10.80	17.28	21.60	22	27.60	44.16	55.20
8	10.80	17.28	21.60	23	28.80	46.08	57.60
9	12.00	19.20	24.00	24	30.00	48.00	60.00
10	13.20	21.12	26.40	25	31.50	50.40	63.00
11	14.40	23.04	28.80	26	33.00	52.80	66.00
12	15.60	24.96	31.20	27	34.50	55.20	69.00
13	16.80	26.88	33.60	28	36.00	57.60	72.00
14	18.00	28.80	36.00	29	37.50	60.00	75.00
15	19.20	30.72	38.40	30	39.00	62.40	78.00
16	20.40	32.64	40.80	31	40.50	64.80	81.00
17	21.60	34.56	43.20	32	42.00	67.20	84.00

MANUAL TRAINING EQUIPMENT

SELECTING EQUIPMENT

Our specialists are ready to assist school officials in the selection of woodworking machinery.

When erecting a new building, get into touch with us while your plans are being developed. Let our engineering department with its specialists and wide experience in school work, lay out your manual training department. If wood turning is to be featured Lathes come first in selecting equipment. A Plain 4 Foot Bed Lathe should be provided for each student in a class. One Lathe, with 6 or 8 foot bed, carriage, outside face plate, floor stand, rest, and special accessories for demonstration and special work should also be provided.

Woodturning is to manual training what algebra and Latin are to the academic department, specifically a training of the hand the eye and the mind to co-ordinated effort.

For pattern making, in addition to sufficient lathes for the class, the Band Saw, Jointer, Universal Saw, Surfacers, Universal Borer and Sander follow in importance in the order named.

For cabinet or furniture making, the Variety or Universal Saw, Jointer, Band Saw, Mortiser, Surfacers, Sander and Tenoner should be selected in the order named.

Tool Grinders, preferably the oilstone type, and Electric Glue Heaters should be provided for either kind of work.

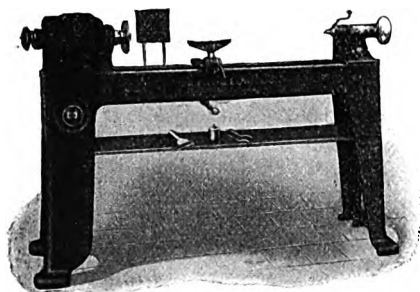
Wherever possible individual motor drive should be used.

Finally, in selecting machines judge first — Are they thoroughly safe-guarded, both mechanically and electrically? This means all gearing enclosed with heavy iron guards built as part of the machines, all belts either built in or enclosed with heavy wire mesh guards; cutter heads, saw blades, etc., provided with efficient and practical guards, the use of circular cutter heads on Hand Planers enclosed switches and rheostats and similar standardized safety devices.

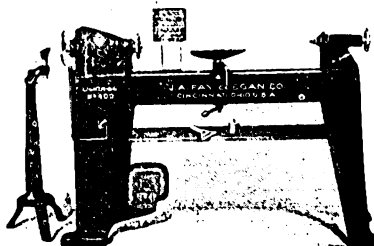
Select only machines of simple design—the kind that can be operated by boys without breaking or getting anything out of order.

Illustrations and descriptions of these machines will be found in the Machinery Section in the rear of the catalogue.

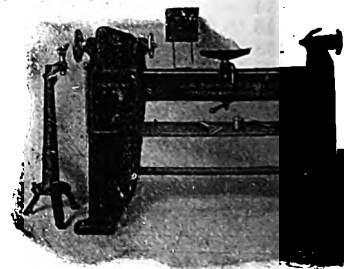
MANUAL TRAINING LATHES



NO. 400-A—FIG. 1864



NO. 400—FIG. 1865



NO. 400-C—FIG. 1866

These lathes are designed for use in manual training schools and colleges, and are absolutely foolproof. They can be operated by the most inexperienced and careless student without danger of injuring the machine or the operator. They are from 300 to 500 pounds heavier than any other manual training lathes made.

No. 400 Type A is made with variable speed motor head stock, available for use on direct current only. Motor is a $\frac{1}{2}$ H. P. 750—3,000 r. p. m., totally enclosed. The controlling apparatus is built in, and also totally enclosed, consisting of a speed control giving fifteen speeds by means of hollow aluminum cylinder, line cut-out switch, automatic overload and low voltage release.

No. 400 Type B is for use on an alternating current and has a $\frac{1}{2}$ H. P. constant speed motor mounted in the base of the machine. Belt driven to the head stock spindle, giving four speeds. All operating apparatus is totally enclosed, and the stopping, starting and speed changes are accomplished by means of the one handle control.

No. 400 Type C is similar to the B type, except it is intended for use where power is taken from a line shaft or to be connected up in series, having a number of lathes driven by one motor, and for this purpose having a drive shaft self-contained, mounted in bearings with adjustable bearings and enclosed in hollow tubing.

No. 400 Type D is made with variable speed motor headstock for use on alternating current only. Motor is a $\frac{1}{2}$ H. P. totally enclosed, having four speeds 550, 1140, 1720 and 3400. Controlling apparatus is built in, consisting of a speed controller, line cut-out switch, automatic overload and low voltage release.

Capacities: All styles made 12" swing and standard bed is 4' long and 24" between centers, but can be extended to any length required. All spindles regularly threaded on both ends. Outside floor stand and rest can be used on any machine and is furnished as additional equipment when ordered. Hand feed carriage with plain or compound swivel rest, set-over, tail stock and other special equipment can be applied to either type.

Although designed primarily for manual training work, these lathes have been adopted by many large manufacturers who recognized in them a speed lathe of superior merit in every respect. Interested parties are invited to write for large special bulletin, illustrating and describing these machines in detail.

MANUAL TRAINING EQUIPMENT

PEXTO

SHEET METAL WORKING EQUIPMENT



FIG. 1867

We all know the subject of sheet metal working takes care of itself. Boys look forward to it with pleasure and to many of them it is their first opportunity to run a machine. Sheet metal working has many attractive features and boys find it a very interesting kind of shop work. It is easy to connect home interest with the school shop by making repair work a part of the course. Kitchen utensils, pans, sugar scoops, funnels, dust pans, bread and cake boxes and the repair of gutters and down spouts are interesting projects. Sheet Metal Work develops a facility in the handling of a variety of hand tools. A larger number of light machines and tools are used than in any other branch of metal work. Since the machines are hand operated they are entirely under the control of the boy and not in any sense automatic as some machines are. The mind of the boy must be on his work and a corresponding mental development results from this concentration.

Sheet Metal Work is a large and growing industry. It is intimately connected with the building trades and an increasing proportion of the costs of building are spent for cornice work, roofing, skylights, ornamental ceilings, ventilating, heating, etc. The rapid growth of the automobile industry requires the labor of thousands of men on bodies and radiators and the invention of sheet metal boats and a large line of metal furniture are opening up new fields every day. The sheet metal working trades offer unusual opportunities to young men who possess the necessary training—today more than ever. The work is not confining, not unhealthful and not dangerous. As a trade it has increased in importance from year to year and the introduction of machinery has had much less effect on it than on the work of the moulder, the blacksmith, or the printer.

For almost a century Pexto Sheet Metal Working Tools and Machines have been foremost on the American Market—no other tools and machines are as good. Good tools are as essential for the untrained boy as for the expert. In Manual Training Work nothing but poor tools will serve to discourage enthusiastic, ambitious boys.



FIG. 1868

MANUAL TRAINING EQUIPMENT

PEXTO

SHEET METAL WORKING EQUIPMENT

ELEMENTARY SHEET METAL COURSE

In an elementary sheet metal course where copper work is not included, a great variety of problems can be constructed from tin plate, light galvanized iron and black sheet iron, giving practice in the processes of cutting, wiring, grooving, riveting, forming, edging, double seaming, filing and soldering. The following problems may be adapted to a course of this kind, and a few of an endless number of useful articles that can be worked out by the student for the home and school use:

Small Cup,
Funnel,
Apple Corer,
Fruit-filler,
Oil Can,
Match Box,
Cake Pan,
Strainer,
Cake Box,
Hall Lantern,

Liquid Measures,
Mail Box,
Dipper,
Dust Pan,
Bank for Savings,
Tea Steepers,
Roasting Pans,
Coffee Pot,
Pencil Box,
Porch Light,

Watering Pot,
Cereal Boiler,
Tool Box,
Flour Scoop,
Sink Strainer,
Waste Cans,
Candle Holder,
Lamp Shade,
Colonial Lantern, etc.

EQUIPMENT

The equipment is not unduly expensive and may be made as extensive as one desires to make it. A small set of hand machines and a few each of the different small tools will do to carry the work in a class of fifteen to twenty pupils. There is not the same need for individual outfits in sheet metal working as in wood work, as the tools can be used in general by all members of the class. The following list may be helpful to those who are about to add sheet metal to the course of study in the elementary work:

1 No. 132 B Squaring Shears,
1 No. 374 Forming Machine,
1 No. 63 Adjustable Folding Machine,
1 No. 500 Grooving Machine,
2 No. 579 Small Burring Machines,
2 No. 545 Small Turning Machines,
1 No. 526 Wiring Machine,
1 No. 902 Beak Horn Stake,
2 No. 936 Square Stakes,
1 No. 965 Roundhead Stake,
1 No. 971 Conductor Stake,
2 No. 925 Blowhorn Stakes,
1 No. 957 Needle Case Stake,
1 No. 921 Double Seaming Stake,
1 No. 956 Candle Mould Stake,
1 No. 927 Creasing Stake,
1 No. 944 Hatchet Stake,
2 No. 910 Hollow Mandrel Stakes,
1 No. 960 1/2 Solid Mandrel Stake,
2 P703 Vises,
3 No. 2 Cast Bench Plates,
12 No. 8 Straight Snips,
6 No. C9 Circular Shears,
12 No. 42 Riveting Hammers,
12 No. 4 Setting Hammers,
1 No. 2 Raising Hammer,

1 No. 561 Setting Machine,
1 No. 636 Double Seaming Machine,
1 No. 4 Beading Machine,
1 No. 790 Portable Lever Punch,
1 No. 2 Gutter Beader,
1 No. 101 Tinner's 3 ft. steel rule,
8 Fire Pots (gas or charcoal)
1 No. 0 Riveting Hammer,
6 24 inch Steel Squares,
6 12-inch Steel Squares,
1 12-inch Wing Dividers,
12 8-inch Wing Dividers,
12 1/2-inch Wire Chisels,
12 Small Prick Punches,
12 Small Solid Punches,
12 Steel Scratch Awls,
12 Tinner's Hickory Mallets,
1 Set Hollow Punches,
12 Rivet Sets, Various Sizes,
2 Pairs Cutting Nippers, 1 1/2 in. jaws,
12 7-inch Flat Nose Pliers,
8 Pairs 3 lb. Soldering Coppers,
4 Pairs, 4 lb. Soldering Coppers,
1 Pair 6 lb. Soldering Coppers,
6 12-inch Flat Files.

For an advanced course in sheet metal a wide range of equipment may be suggested but the work can be carried on with good results with the addition of a few machines consisting of one 4 foot Cornice brake, one No. 551 Elbow edging machine, one No. 58 Crimping machine, one No. 546 Large turning machine one No. 402 Band iron Brace bender.

Catalogue illustrating and describing Pexto Sheet Metal Equipment will be sent upon request.

MANUAL TRAINING EQUIPMENT

BUFFALO STATIONARY DOWN DRAFT FORGES

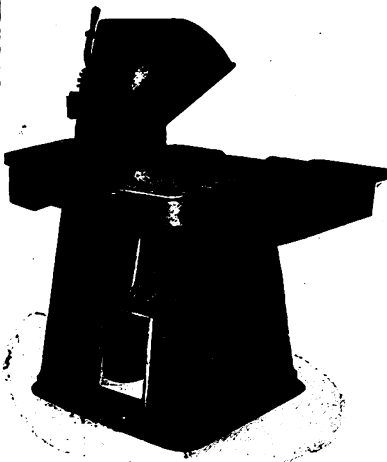


FIG. 1869

DOUBLE

This makes an excellent manual training school forge because of its compactness. It is identical in design and construction with the No. 92-D Single but has two fire pans instead of one. Each hearth has its own tuyere with clinker-breaking blast valve. Separate blast gates and water tanks are also provided and the green coal may be stored between the hoods.

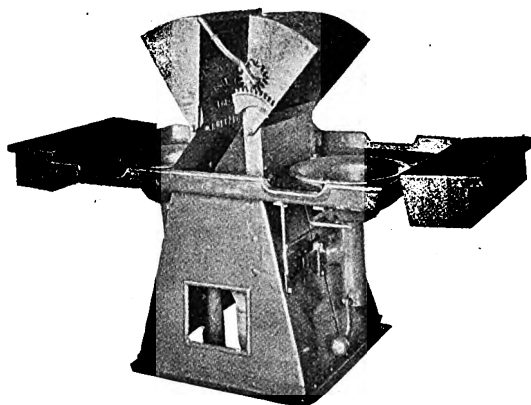


FIG. 1870

SIZE OF FANS REQUIRED FOR SCHOOL FORGE SHOPS

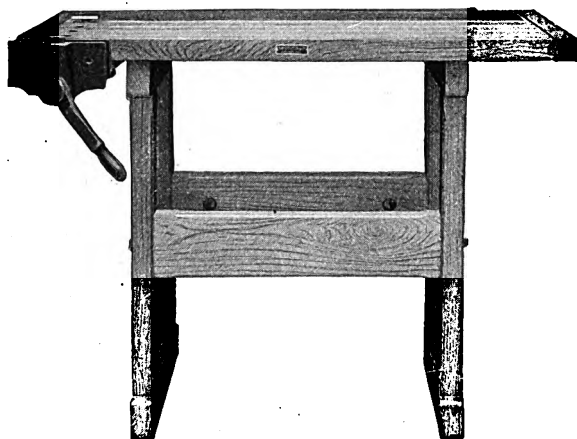
[Press. of Blast 2½ Oz. per Sq. In.]	Num. of Buffalo 92-D Single Forges	Blast						Exhaust					
		Diam. Main Blast Duct	Steel Press. or B Vol. Blower					Diam. Main Exh. Duct	Exhaust Fan at 1½ Oz. B Vol. or Steel Plate Exhauster				
			Blower Size	Diam. Outlet	A.P.M. per Forge	R.P.M.	H.P.		Fan Size	Diam. Inlet	A.P.M. per Forge	R.P.M.	H.P.
1	3"	3 S. P. B.	4¾"	430	3150	0.73	6"	2 B Vol.	6 1/16"	458	2420	0.34	
2	4"	3 S. P. B.	4¾"	215	3150	0.73	9"	4 B Vol.	9 1/8"	507	1490	0.76	
3	5"	3 S. P. B.	4¾"	143	3150	0.73	10"	5 B Vol.	10 5/8"	485	1345	1.09	
4	6"	3 S. P. B.	4¾"	107	3150	0.73	12"	6 B Vol.	11 1/8"	515	1100	1.54	
5	7"	3 S. P. B.	4¾"	86	3150	0.73	14"	30" Pl.	15 1/8"	470	1410	2.08	
6	8"	3 S. P. B.	4¾"	72	3150	0.73	15"	35" Pl.	17 1/2"	530	1210	2.82	
7	8"	3 S. P. B.	4¾"	61	3150	0.73	16"	40" Pl.	20"	595	1060	3.68	
8	9"	4 S. P. B.	5"	58	2660	0.78	17"	40" Pl.	20"	520	1060	3.68	
9	9"	5 S. P. B.	5 3/8"	57	2330	0.88	18"	45" Pl.	22 1/2"	585	943	4.66	
10	10"	3 B Vol.	7 5/8"	93	2195	1.23	19"	45" Pl.	22 1/2"	527	943	4.66	
11	10"	3 B Vol.	7 5/8"	90	2195	1.23	20"	50" Pl.	25"	590	848	5.78	
12	11"	3 B Vol.	7 5/8"	82	2195	1.23	21"	50" Pl.	25"	540	848	5.78	

No. 92-D	Size of Double Hearth Inches	Size of Tanks Inches	2 Blasts Inches	Exhaust	Weight lbs.	Price	Extra For Hand Blower
Single	27x33	7 x9x28	3	6	800	.....	.....
Double	57x34	6 1/2 x9x28	3	8	960	.....	(2)

For other types of Forges see index.

MANUAL TRAINING EQUIPMENT

HOME WORK SHOP BENCH



NO. 01—FIG. 1872

Fitted with Vise and Steel Bench Dog.

Top: 42 inches long, 22 inches wide, $1\frac{3}{4}$ inches thick. End bolsters grooved into the main portion of the top supports the tool recess and backboard, all being jointed by tongue and grooved joints in the most substantial manner.

Prices on application.

PERFECTION BENCH



FIG. 1873

Especial attention is directed to the exclusive method of reinforcing by means of heavy bolts not only the base but the top as well. This special construction is shown in illustration.

The working portion of the top is composed of strips $1\frac{1}{2}$ inches wide, glued up and finished $2\frac{1}{4}$ inches thick or over. These strips are further reinforced by $\frac{1}{2}$ -inch bolts with flush countersunk heads.

The bolster on each end is attached with a deep tongue and groove and anchored by long heavy draw bolts.

32 in. high, 52 in. long, 22 in. wide.

Prices upon application.

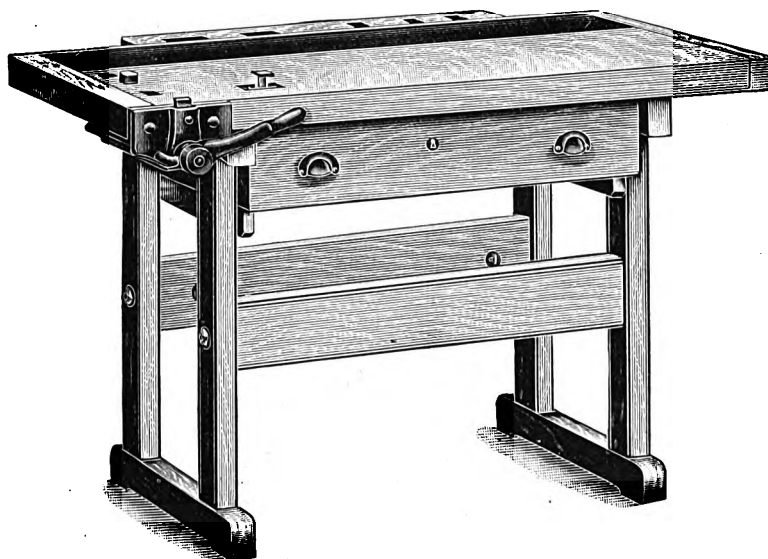


FIG. 1871

SHELDON'S "ALASKA MODEL" BENCH

Dimensions: Length, 52 inches; width, 30 inches; height, 32 inches; work top, 22 inches wide; tool recess, 7 inches wide. Drawer, $5\frac{1}{2}$ inches high, 30 inches long, 19 inches deep; fitted with bronze pulls. Fitted with the Toles model vise, steel dog and malleable bench stop. Also with concealed tail vise.

Made also in a 42-inch length; "The Denver Model."

Price on application.

PEXTO SHEET METAL WORKING MACHINES

SQUARING SHEARS

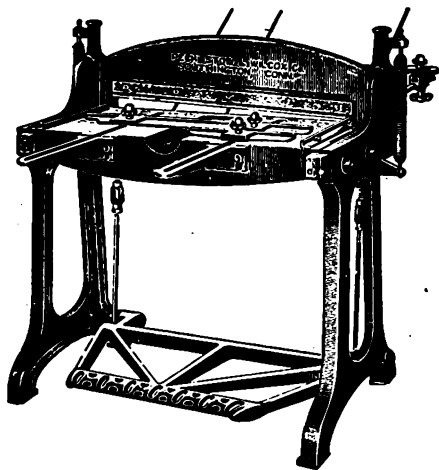


FIG. 824
NO. 122-B SERIES
CAPACITY NO. 18 GAUGE IRON
AND LIGHTER

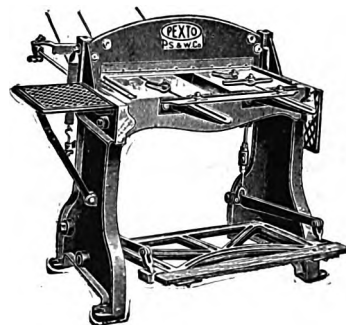


FIG. 825
NO. 0230-A SERIES
CAPACITY NO. 16 GAUGE IRON
AND LIGHTER

Pexto Squaring Shears have a reputation of nearly a century for absolute supremacy in quality, workmanship and progressive excellence. Stiffness, rigidity, durability and ease of operation have gained for Pexto Squaring Shears a popularity known the world over.

The Cutting Knives are of the highest grade hardened steel, the best that can be procured for the purpose, scientifically welded iron. The grinding is accurate, ample provisions being allowed for wear and can be removed from machine conveniently for regrinding.

Gibs are provided for taking up wear of Cutting Bar. Are so designed that grit and dirt cannot penetrate to the working surfaces.

Gates or Crossheads to which the Upper Knife is attached are proportioned to eliminate any tendency to spring when cutting within the rated capacity.

Shear Beds are bolted to the housings and can be shifted to and from the Upper Knife to compensate for the regrinding of the Cutting Knives. Beds are graduated in inches and fractions for accurate and quick setting of the Bed Gauges.

Treadles are extra heavy with one piece tread.

Hold-Down Attachments as fitted to Pexto Shears are positive and exert pressure upon the sheet while cutting, preventing any drawing from between the Cutting Blades.

Pexto Shears are accompanied with Front, Rear and Side Gauges, the Rear Gauge being mounted on Brackets or Arms fastened to the Cutter Bar, and can be adjusted closely to the Lower Knife permitting accurate gauging of the narrower slits. Extra heavy Front Arms which support the Front Gauge where making wide cuts are fastened to Bed of Shears.

Rear Gauge Rods where furnished are adjustable, intended for leading material to the face of the gauge insuring more accurate cutting and preventing the sheet from finding its way under the gauge when feeding.

Gears as used in these Power Shears are accurately cut from solid castings which insures a perfect bearing thereby reducing the loss of power through gearing to a minimum.

The Clutches controlling Pexto Power Shears are simple in construction and positive in action. A slight depression of the Treadle will trip the Clutch and unless the Treadle is kept depressed the motion of the Cutter Bar will stop automatically at its highest point without any stoppage of the Fly Wheel. Working parts in Clutches are accurately made of hardened tool steel and well proportioned.

Capacities: Capacities given apply to soft steel or iron. In steel running higher in carbon the hardness of stock must be taken into consideration. Squaring Shears for material exceeding the extreme thickness recommended by us should never be used even if the pieces to be cut are of small width. The capacity of Squaring Shears being influenced by the condition of the Knives and adjustment, it is suggested when making selections to figure ample leeway capacity.

Number.....	No. 122-B Series				No. 0230-A Series		
	122B	132B	137B	142B	0230A	0236A	0240A
Length, in.....	22	30	36	42	31½	37	42
Weight, lbs.....	375	540	650	850	815	950	1000
Price, without Side Tables and Top Shelf.....	.....	.....	.....	.....	.....	.....	.....
Extra for Side Tables, per pair.....	.....	.....	.....	.....	.....	.....	.....
Extra for Top Shelf.....	.....	.....	.....	.....	.....	.....	.....
Price, with Hold-down attachment.....	.....	.....	.....	.....	.....	.....	.....

Nos. 137B and 142B are furnished regularly with hold-down attachment.

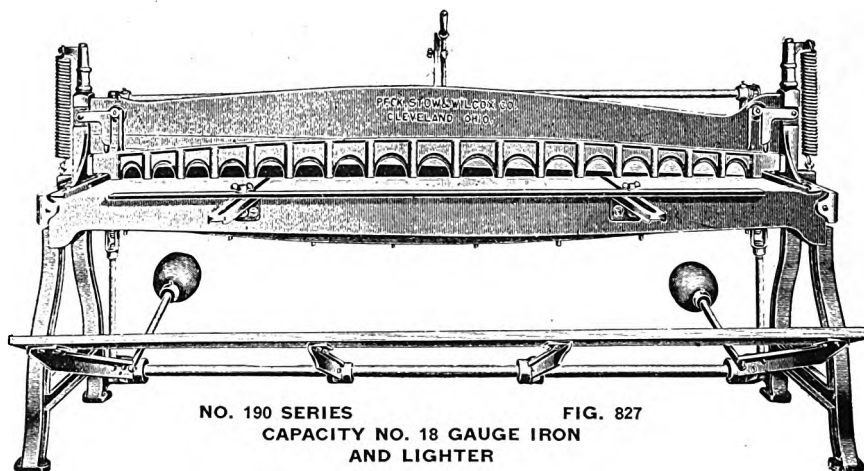
No. 132B is not fitted with hold-down attachment.

No. 0230A Series furnished complete with Side Tables, two pairs of Front Arms, one pair each short and long and complete gauge equipment and hold-down attachment.

PEXTO SHEET METAL WORKING MACHINES

CORNICE MAKERS' SQUARING SHEARS

NOS. 190 AND 191



NO. 190 SERIES
CAPACITY NO. 18 GAUGE IRON
AND LIGHTER

These Shears are fitted with Automatic Back Gauge operated from the front of the machine through a hand lever and position of Back Gauge is indicated on a graduated steel scale attached to the top of right hand back arm. Same can be plainly seen at any point from front of machine. Gauge moves parallel to the cutting blades.

Number.....	190	191
Length, in.....	72	96
Weight, lbs.....	2100	2900
Price, complete with hold-down attachment		

COMBINED BENCH AND SLITTING SHEARS FOR SLITTING AND INSIDE CUTTING

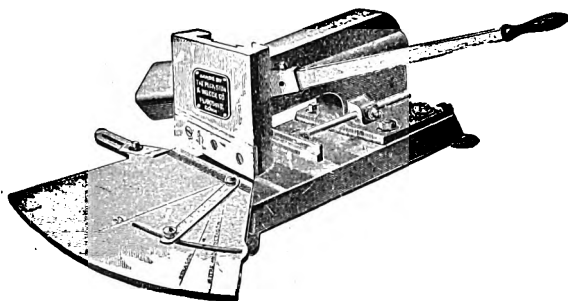


FIG. 828
CAPACITY NO. 248 — 18 GAUGE IRON AND LIGHTER.
CAPACITY NO. 249 — 16 GAUGE IRON AND LIGHTER.

These Shears are constructed on entirely original principles. They surpass all other Shears in the variety of work performed. A splendid, practical Shears for range manufacturers and for general use in car shops, automobile plants and other shops where a variety of straight and irregular cutting is being done. They often prove a desirable substitute where work is too large or not of a sufficient quantity to warrant the use of costly dies.

Number	248	249
Length, cutting blades	6½	9
Depth of throat	9½	15
Shipping Weight, lbs	165	490
Price		

SCROLL SHEARS

FOR CUTTING CIRCLES, OVALS, OGEES AND IRREGULAR SHAPES

These Shears have created a big demand because of their service and satisfaction to those who use them. They will cut Circles, Ovals, Ogees and all irregular shapes with the greatest ease. They are well adapted for cutting from the center of a sheet.

Mounted in a Standard which screws to the bench and adjustable to any angle required is another Pexto feature.

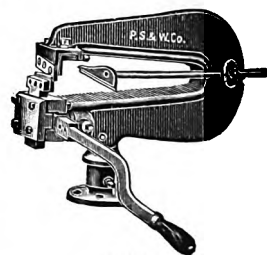


FIG. 829
CAPACITY NO. 20 GAUGE
IRON AND LIGHTER.

The length of cut is regulated by means of a Set Screw in frame back of lower Blade. To shorten cut, turn screw in; to lengthen cut, turn screw out.

Upper Blade can be adjusted for wear by means of the two Rear Adjusting Screws.

Number	268	269
Length, cutting blades, ins.....	4	4½
Depth of throat, ins.....	10¾	17
Shipping Weight, lbs.....	90	155
Price, each.....		

PEXTO SHEET METAL WORKING MACHINES

RAPID SLITTING SHEARS FOR GENERAL SLITTING

CAPACITY NO. 16 GAUGE IRON AND LIGHTER

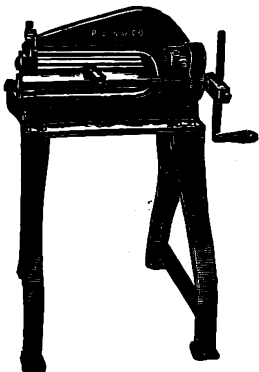


FIG. 830

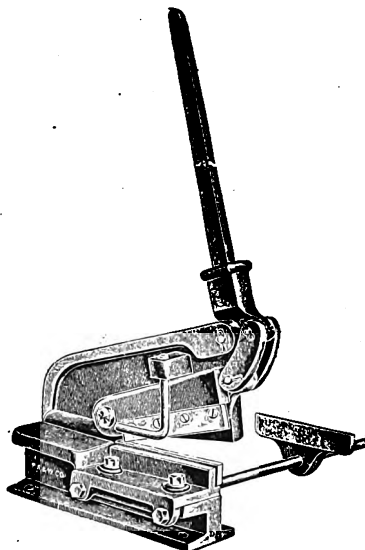
The cutters on these shears have two cutting edges making them reversible and the crank is adjustable to different lever-ages. Where floor space is limited these Shears will prove a good substitute for long-length Squaring Shears.

Number	255
Depth of Throat, ins.	18
Size, Table, ins.	20x8
Shipping Weight, lbs.	325
Price, each	

LEVER SHEARS

FOR SLITTING HEAVY SHEETS

CAPACITY NO. 10 GAUGE IRON AND LIGHTER



These shears are now made with semi-steel Frames. Serviceable shears for slitting Sheet Iron in any length or width and for cutting Light Narrow Bars, $\frac{1}{4}$ inch square and $\frac{1}{4} \times \frac{1}{2}$ inch.

Number	0296
Length Cutting Blades, ins. ...	10
Shipping Weight, lbs.	160
Price	

FIG. 831

RING AND CIRCULAR SHEARS FOR CUTTING RINGS AND CIRCLES

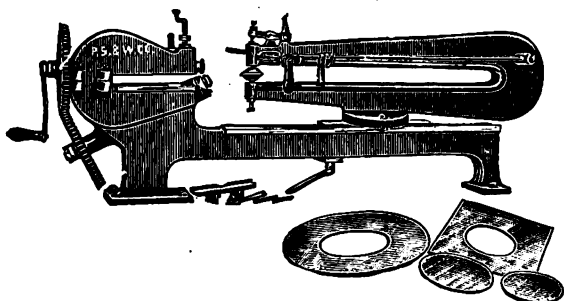


FIG. 832

CAPACITY NO. 20 GAUGE AND LIGHTER.

These improved patterns make up for a very useful and efficient bench Ring and Circular Shears intended for cutting circles or internal rings and irregular curves. In circular cutting the blanks are clamped between rubber covered discs by means of a quick acting, eccentric, lever device adjustable for exerting extreme uniform pressure to prevent the work from slipping and insuring more accurate cutting. This method permits for the clamping and removing of blanks with greater rapidity than with old Crank Screw method. The bed on which the Tail Piece slides is graduated in inches and fractions of inches for quick setting of the Tail Piece for the size circle to be cut. The angular position of Cutters allows for as clean cutting on the inside as on the outside of circle.

Number	298	299
Will circle from square blanks, ins.	$3\frac{1}{4}$ to $22\frac{3}{4}$	to $42\frac{1}{2}$
Will cut rings small as (inside diam.) ins.	$3\frac{1}{4}$	$3\frac{1}{4}$
Will cut rings large as (outside diam.) ins.	22	$42\frac{1}{2}$
Shipping Weight, lbs.	195	290
Price		

CIRCULAR SHEARS

NO. 289 WAUGH'S PATENT IMPROVED

These Shears are made from heavy patterns proportioned throughout for maximum strength and are intended for cutting outside circles from heavy iron. The cutting Head may be utilized as a straight Slitting Shear, a suitable gauge being fitted to the Cutting Head for this purpose. A positive Clutch controlled through a hand lever for instantaneous starting and stopping of the cutters is provided. The machine is mounted on heavy cast iron legs.

Depth of cutting head to Gauge	9 ins.
" " " " Frame	$9\frac{1}{2}$ ins.
" " circle arm	35 ins.
Will circle from square blanks	5 to 50 in.
Weight	700 lbs.
Price	
Price for extra cutters per pair	

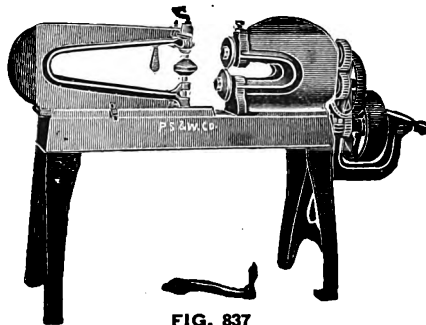


FIG. 837

CAPACITY NO. 14 GAUGE IRON AND LIGHTER

PEXTO SHEET METAL WORKING MACHINES

CORNICE BRAKES

HARE'S PATENT FOUR LEAF CORNICE BRAKE. ALL IRON CONSTRUCTION—STEEL BENDING BLADES

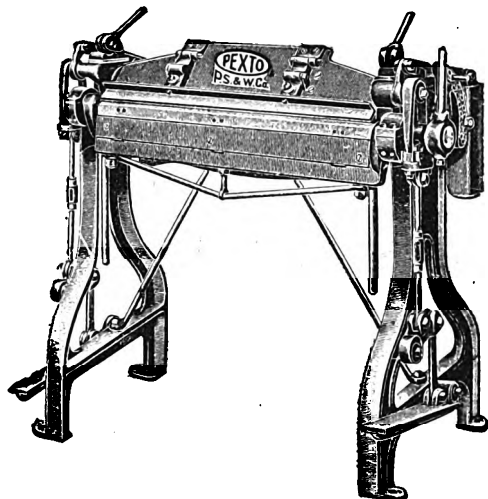


FIG. 841
CAPACITY NO. 18 GAUGE IRON AND LIGHTER

NO. 1000 SERIES
STEEL CONSTRUCTION

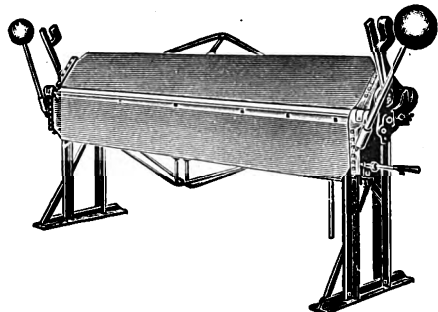


FIG. 842
CAPACITY NO. 18 GAUGE IRON AND LIGHTER

COMBINATION BRAKE AND FOLDER
NO. 93

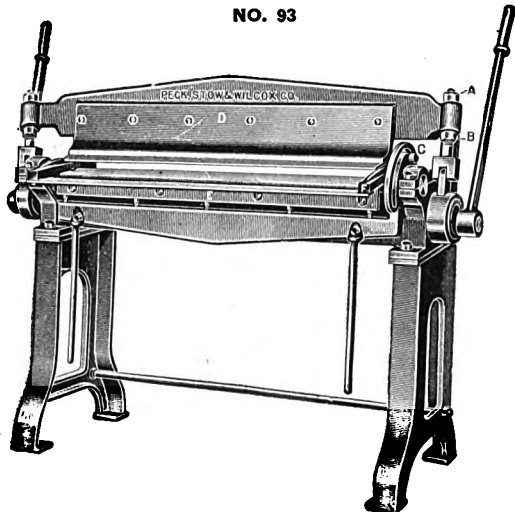


FIG. 843
CAPACITY NO. 16 GAUGE IRON AND LIGHTER

These Brakes are designed especially for the small shops where space is limited. They will prove very serviceable for forming sheet metal into various shapes and designs.

Work can be formed on these Machines which cannot be formed on any other Machine or Combination of Machines. They are being used extensively by tinsmiths, sheet metal workers and art brass workers.

Hare's Patent Four Leaf Cornice Brake has a distinctive, attractive feature consisting of an attachment or fourth leaf for making circular or semi-circular forms. Furnished with one forcing bar and seven formers making circular and semi-circular bend: viz. 3, 2½, 2, 1½, 1¼, 1⅜ and 1 inch. No. 681 does not require weight on bending leaf. No. 682 has one weight on bending leaf. Other numbers have two weights on bending leaf.

The parts subject to wear or strain are protected and strengthened in the most substantial manner. The Journals have "Roller Bearings" reducing the friction to a minimum. The stop Bracket on Right Hand End of Brake can be quickly and easily adjusted to bend any angle wanted.

Number	681	682	683	684	685
Length.....ins.	37½	42½	52	74	98
Shipping Weight.....lbs.	650	850	1070	2300	3650
Price.....					

These Brakes are of pressed steel construction and owing to their light weight are handy to move around for outdoor construction work.

Number	1000	1001	1002	1003
Length.....ins.	61	73	97	121
Shipping Weight.....lbs.	750	800	1000	1900
Price.....				

NOTE: Furnished with one forcing bar and five formers for making circular and semi-circular bends.

CAPACITY NO. 14 GAUGE IRON AND LIGHTER

Number	1009	1010	1011	1012
Length.....ins.	36½	48½	97	121
Shipping Weight.....lbs.	650	800	2000	3000
Price.....				

NOTE: Furnished with one forcing bar and five formers for making circular and semi-circular bends.

The construction of this machine is of all iron with steel bending blade and allows for easy and accurate formation of wide angles or narrow locks within the rated capacity with no danger of springing. The cross head is brought down and the work securely clamped through eccentrics actuated by hand levers from either end of machine. This arrangement is a one-man feature, making the changing of position for clamping the work unnecessary, a feature of individuality not to be found in any other Brake. Adjustments are provided for in the eccentric connection allowing for a maximum pressure to bear on the work while in the process of forming, preventing the work slipping from a true line.

Length.....ins.	42
Clamping Jaws open....."	1½
Will form open or closed locks in width....."	⅛ to 1½
Will form open or closed locks....."	
½ to 1½ on No. 16 gauge iron, ⅜ to ¾ on No. 18 gauge iron, ¼ or ⅜ on No. 20 gauge iron, ⅛ on No. 22 gauge iron, ⅛ on No. 24 gauge iron	
Shipping Weight.....lbs.	950
Price.....	

Furnished with seven formers for making circular and semi-circular bends in cornice work, etc., viz. 3, 2½, 2, 1½, 1¼, 1⅜, and 1 inch. Fitted with adjustable gauge for gauging ⅛ to 4 inches. Form "D" with bending blade fitted is detachable and may be replaced for sectional short forms for a wide range of pan work up to 4 inches in depth and of a width in accordance with the depth of the pan to be formed. The only Brake of its kind that will form angles and closed and open locks.

PEXTO SHEET METAL WORKING MACHINES

FOLDING MACHINES

FOR FORMING EDGES AND ANGLES, PREPARING SEAMS FOR GROOVING IN PIPE AND FOR GENERAL EDGING

BAR FOLDING MACHINE—NOS. 62-63

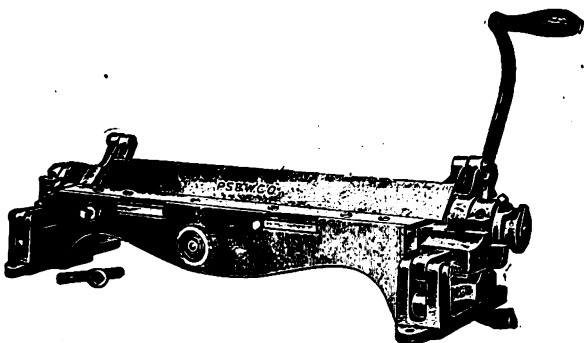


FIG. 844

Will form $\frac{1}{4}$ inch locks and wider, No. 22 Gauge Iron and lighter, $\frac{1}{8}$ inch locks on No. 24 Gauge, $\frac{1}{4}$ inch locks on XX in.

These Folders are intended for forming the edges of sheet metal at various angles. They will produce closed locks as well as open or round locks for inserting a wire in the flat sheet.

Open or round locks for wiring are made by raising the Folding Bar at right angle. The wing is then adjusted for the size of wire to be used through the setting of a wedge that moves to left and right in a slot on Folding Bar. An improvement consisting of a pin in the frame prevents the dropping of the wing below the Gripping Jaw, the wing dropping in a proper position automatically in the process of folding producing accurate and uniform round locks. This improved adjustment permits for more rapid execution, the blanks sliding more easily between the Gripping Jaw without obstruction.

Gauge is adjustable and regulates the width of fold by turning gauge wheel in front and center of machine. The width to which the gauge is adjusted is indicated on scale in fractions of inches and after set, is firmly secured through lock screw with a wrench provided for the purpose.

Adjustable stop is provided to permit the forming of any desired angle in addition to regular square and bevel stops.

A gripping Jaw clamps the material securely while the bending takes place, guaranteeing the forming of square joints or angles, narrow or wide locks of uniform width the entire length.

Number	62	63
Length.....ins.	20	30
Will form closed and open locks.....	$\frac{1}{8}$ to 1	$\frac{1}{4}$ to 1
Will form open locks to receive a wire up to.....ins.	$\frac{1}{4}$	$\frac{1}{4}$
Shipping Weight.....lbs.	102	185

Gauge is adjustable and operates with a hand wheel. Wing adjustable for forming closed locks or open locks for wiring.

SHEET IRON FOLDER—WOOD BOTTOM



FIG. 846

CAPACITY NO. 22 GAUGE IRON AND LIGHTER

Will Turn Locks $\frac{1}{4}$ to $\frac{1}{2}$ in., with Milled Bar and Adjustable Gauge.

Nos.....	38	39
Length, Inches	48	30
Ap. Wt. Each	185	75
Each.....		

NOTE: No. 38 can be constructed to form lock as wide as $1\frac{1}{2}$ inch at a minimum extra cost.

PIPE FOLDER—WRIGHTS' PATENT



FIG. 845

CAPACITY NO. 22 GAUGE IRON AND LIGHTER.

These Folders will fold the edges of sheets formed in cylindrical shape. They will prove desirable machines for edging sheets while in the flat as well.

A practical feature consisting of a Round Steel Rod Attachment which permits for the turning of edges on sheets of any length is fitted to Nos. 12A & 14. To turn an edge longer than the length of the machine, the round rod is placed in the machine so that the sheet will pass over it allowing the folding bar to turn against its round surface. A slight bend is first made the entire length of the sheet repeating this operation of bending until the lock is finished or far enough to close it down in the ordinary way. With machines made for turning locks wider than $\frac{3}{8}$ inch steel strips are furnished and are used under the sheet between the clamping plate to increase the width of the lock of a size in keeping with the capacity of the machine.

Number	1	0	12A	14
Length.....ins.	30	42	30	42
Will form locks.....ins.	$\frac{1}{4}$, $\frac{3}{8}$	$\frac{1}{4}$, $\frac{3}{8}$	$\frac{1}{4}$, $\frac{3}{8}$	$\frac{1}{4}$, $\frac{3}{8}$
Shipping Weight.....lbs.	85	135	90	140
Price.....				

Nos. 1 and 0 are not fitted with round steel rod attachment and are furnished less the steel strips, these numbers being adjustable for turning only two sizes of locks. Nos. 12A and 14 furnished as per illustration.

SHEET IRON FOLDER

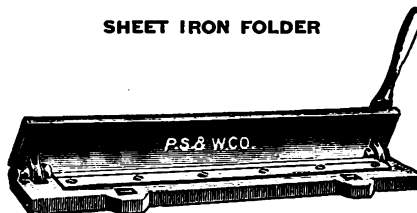


FIG. 847

CAPACITY: NO. 2B NO. 22 GAUGE IRON AND LIGHTER NO. 3B NO. 24 GAUGE IRON AND LIGHTER

The most inexpensive, practical and durable Sheet Iron Folder manufactured intended for common ordinary use.

Number	2B	3B
Length.....ins.	30	41
Will form locks.....	$\frac{1}{4}$ to $\frac{3}{8}$	$\frac{1}{4}$ to $\frac{3}{8}$
Shipping Weight.....lbs.	105	100
Price.....		

NOTE: No. 3B has handle in center of machine.

PEXTO SHEET METAL WORKING MACHINES

DOUBLE SEAMING MACHINES

MOORE'S PATENT

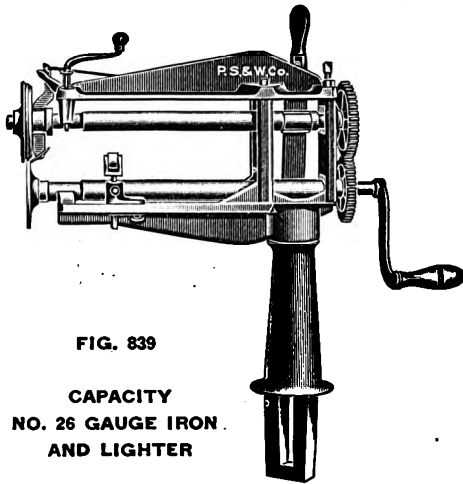


FIG. 839

CAPACITY
NO. 26 GAUGE IRON
AND LIGHTER

These Double Seaming Machines are adapted for general use. They are well suited to the wants of the trade who desire a machine for small work. The size of the lower face determines the smallest size bottom that can be double seamed. With these machines extra Discs are not required. They are so simple in construction and easy to operate that they are preferred for all around double seaming over other types.

Number	644	646
Will receive work in depth.....ins.	15½	10
Size of lower Seaming Face....."	4½	3
Shipping Weight.....approx. lbs.	100	60
Price		

FORMING MACHINES

STOVE PIPE AND TIN PIPE FORMERS.
NO. 355 SERIES

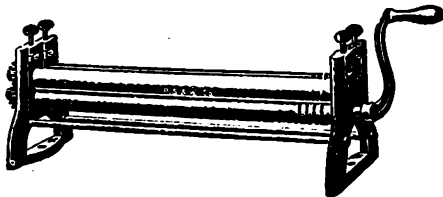


FIG. 848

FOR STOVE PIPE, TURNED STEEL ROLLS

These Formers have been tried and proven as most excellent for general use. The rolls are finely finished, free from indentations and imperfections and are made from special rolled hard steel. A square hole heavy crank is used, an improvement over cranks made with screw thread in that the rolls may be worked in either direction without the crank screwing from shaft.

Number	355	356	357	358
Length of Rolls, ins.....	37	41	31	31
Diam. of Rolls, ins.....	2	2	2	1¾
Shipping Weight, approx. lbs.	170	180	140	120
Price.....				
Shipped boxed regularly.....				

Note.—Grooves cut in Rolls are intended to allow work with a wire to be formed. Wire should only be formed between the grooves cut for that purpose.

FOR TIN PIPE, TURNED STEEL ROLLS

Number	359	361
Shipping Weight, approx. lbs.....	60	30
Length of Rolls, ins.....	20½	12
Diam. of Rolls, ins.....	1½	1
Price.....		
Shipped boxed regularly.....		

Note.—Grooves cut in Rolls are intended to allow work with a wire to be formed. Wire should only be formed between the grooves cut for that purpose.

STOVE PIPE AND TIN PIPE FORMERS
WITH MACHINE CUT STEEL COMPENSATING GEARS
NO. 372 SERIES

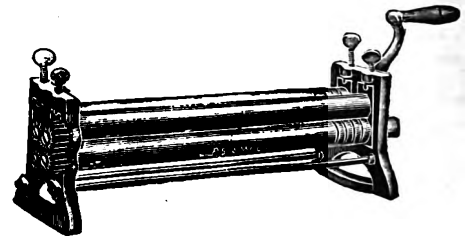


FIG. 851

FOR STOVE PIPE

These Formers are preferable owing to improved arrangement of the gearing. They are fitted with machine cut steel compensating gears. Gears to run smoothly should mesh constantly to a certain depth and the shape of the teeth should be accommodated to such depth. In these Formers the gripping rolls do not mesh with each other but with two gears so that when the gripping rolls are moved the mesh of the gears is unchanged. This insures uniformity of action and durability for the gears, they running more smoothly than cast iron without danger of slipping or breaking with whatever thickness of metal is used.

Number	0372	372	373	374
Length of Rolls, ins.....	42	37	31	31
Diameter of Rolls, ins.....	2	2	2	1¾
Shipping Weight, approx. lbs...	185	165	140	120
Price.....				
Shipped boxed regularly.....				

Note.—Grooves cut in Rolls are intended to allow work with a wire to be formed. Wire should only be formed between the grooves cut for that purpose.

FOR TIN PIPE
NOS. 375-380

Number	380
Length of Rolls, ins.....	20½
Diam. of Rolls, ins.....	1½
Shipping Weight, approx. lbs.....	60
Price.....	
Shipped boxed regularly.....	

Note.—Grooves cut in Rolls are intended to allow work with a wire to be formed. Wire should only be formed between the grooves cut for that purpose.

PEXTO SHEET METAL WORKING TOOLS

FORMING MACHINES

STOVE PIPE AND TIN PIPE FORMERS NO. 381 SERIES

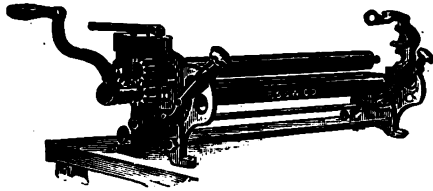


FIG. 849

FOR STOVE PIPE—SLIP ROLL PATTERN

These machines are easily adjusted by means of quick acting levers on each end in rear of machine and can be set for forming any desired size of cylinder in much less time than is required to set other Formers. They are made with slip rolls so that work may be readily taken from end after being formed preventing forcing the work out of shape when being removed from the rolls. Rolls are finely finished, made of special rolled hard steel. They are fitted with machine cut steel compensating gears. In these Formers the gripping rolls do not mesh with each other but with two gears so hung that when the gripping rolls are moved the mesh of the gearing is unchanged. This insures uniformity of action and durability for the gears, they running more smoothly than cast iron cogs without danger of slipping or breaking with whatever thickness of metal is used.

Number	0381	381	382	383
Length of Rolls, ins.	42	37	31	31
Diameter of Rolls, ins.	2	2	2	1 3/4
Shipping Weight, approx. lbs.	200	180	165	140
Price				

Note.—Grooves cut in Rolls are intended to allow work with a wire to be formed. Wire should only be formed between the grooves cut for that purpose.

FOR TIN PIPE—SLIP ROLL PATTERN NO. 384

Number	384
Length of Rolls, ins.....	20
Diam. of Rolls, ins.....	1 1/2
Shipping Weight, approx. lbs.....	80
Price	
Shipped boxed regularly	

Note.—Grooves cut in Rolls are intended to allow work with a wire to be formed. Wire should only be formed between the grooves cut for that purpose.

PATENT SLIP ROLL FORMERS BACK GEARED NOS. 390-400

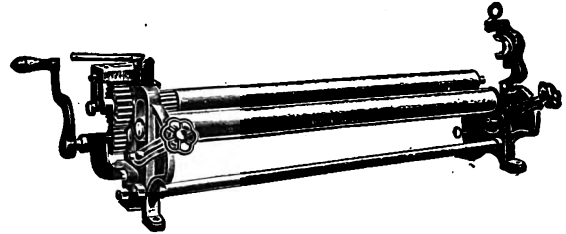


FIG. 852

These Formers are substantially constructed with finely finished rolls made from special rolled hard steel. Steel machine cut compensating gears are used and when furnished for hand power a crank is fitted on both ends. Grooves are cut in rolls to allow work being formed after wired. These machines are easily adjusted by means of quick acting levers on each end in rear of machine and can be set for forming any desired size of cylinder in much less time than is required to set other Formers. They are made with slip rolls so that work may be readily taken from end after being formed preventing forcing the work out of shape when being removed from the rolls. In these Formers the gripping rolls do not mesh with each other but with two gears so hung that when the gripping rolls are moved the mesh of the gearing is unchanged. This insures uniformity of action and durability for the gears, they running more smoothly than cast iron cogs without danger of slipping or breaking with whatever thickness of metal is used.

Number	390	400
Length of Rolls, ins.....	37	31
Diam. of Rolls, ins.....	2 1/2	2 1/2
Ratio of Gearing.....	2 to 1	2 to 1
Size of Pulley, ins.....	12x4	12x4
Shipping Weight, approx. lbs.....	330	275
Price		
“ with Tight and Loose Pulleys for power..		
“ for Iron Floor Legs.....		

Note.—Furnished regularly for hand less legs. Pulleys and Legs are not fitted unless specified.

IMPROVED SQUARE BOX AND SQUARE PIPE FORMING MACHINES NO. 438 SERIES

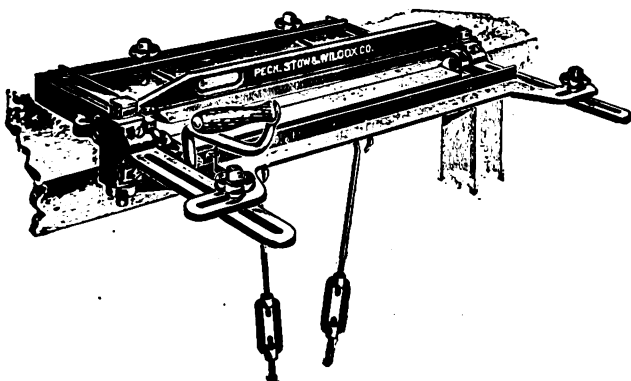


FIG. 850

CAPACITY NO. 24 GAUGE IRON AND LIGHTER

These machines are extensively in use for forming the bodies of Square and Oblong Cans, Heater Pipe, Boxes, etc., with either lapped or locked side seams. A depression of the Foot Treadle clamps the material when the Folding Bar is brought up and the bend made. The work forms around the Clamping Bar and slips out easily for permitting the removal of the formed work without forcing it out of shape. Sheets can be formed at right angles or less.

All parts are smoothly and accurately machined and finished, well proportioned to their sizes and for the work they are intended to do.

Extensive modifications can be made in these machines for suiting individual special requirements.

Number	438	439
Length, ins.....	36	30 1/2
Size of Clamping Bar, ins.....	2 3/4 x 3 1/2	2 1/2 x 2 3/4
Smallest Sq. Pipe that can be formed, ins.....	3 3/4	3
Width Bed Plate, ins.....	15	15
Shipping Weight, approx. lbs.....	325	250
Price		

PEXTO SHEET METAL WORKING MACHINES IMPROVED AUTOMATIC RAPID GROOVER WITH FLATTENING ATTACHMENT NO. 518

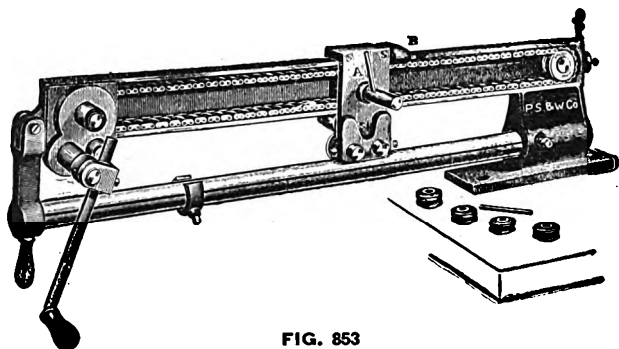


FIG. 853

CAPACITY NO. 24 GAUGE IRON AND LIGHTER

The best machine of its kind for grooving the longitudinal seams in stove pipe and other sheet metal cylinders. It differs from the ordinary Groover in that it is more rapid, the operator standing in front of the machine and does not have to change his position when inserting and removing work and operating the machine. The traveling carriage is quickly and easily returned to the starting point.

Adjustable Stop on upper bar stops the traveling carriage at any desired point to suit length of work. Adjustable Stop on lower bar prevents work from slipping while being grooved. A spring not shown in cut holds latch out of the operator's way while work is removed and inserted in the machine.

Lower Bar or Horn is reversible so that either the flat surface or one of the grooves which is planed into the horn can be turned upward permitting for the locating of seams on the inside or the outside of the work. The seam is put on the inside of work by means of flat rolls which press the seam into one of the grooves planed into the horn. Outside grooving is done in the usual manner by using the grooved rolls and flat surface of horn. The traveling carriage has two rolls, one for grooving and one for flattening the seam at the same operation.

Will groove work length, ins.....	30
Diameter of smallest pipe that can be grooved, ins.....	2
Shipping Weight, lbs.....	200
Price.....	

Note.—Six grooving rolls are furnished one each with $\frac{1}{8}$, $\frac{1}{16}$, and $\frac{1}{32}$ inch grooves, two with $\frac{5}{16}$ inch grooves and one flattening roll.

BRASS MOUNTED GROOVER NO. 502, STOW'S PATENT

These machines are constructed with steel bar and milled horn. They will be found serviceable for grooving the seams on tin cans, pails, boilers, etc. They are easy to operate and simple in construction.

CAPACITY NO. 24 GAUGE IRON AND LIGHTER

Number	502
Will groove work length, ins.....	20
Size of Grooving Horn, large end, ins.....	3
Size of Grooving Horn, small end, ins.....	1 $\frac{3}{8}$
Shipping Weight, approx. lbs.....	102
Price.....	

Note.—Furnished with three Grooving Rolls, $\frac{1}{8}$, $\frac{1}{16}$ and $\frac{1}{32}$ inch.

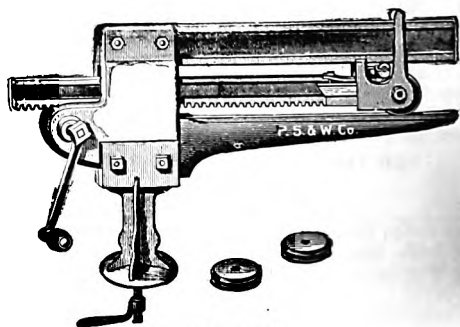


FIG. 854

BEADING MACHINES STOW'S PATENT

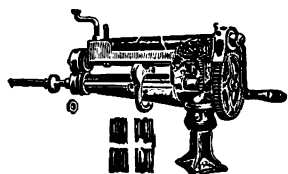


FIG. 855

Pexto Beading Machines are most carefully made in a thorough and workmanshiplike manner. Caps and Frames are reinforced for maximum strength. They have been in constant use for almost a century and may be depended upon to give the very best of good service and satisfaction.

EXTRA ATTACHMENTS

Number	617	619
Extra Beading Rolls, per pair.....
Special Single Bead Rolls $\frac{1}{2}$, $\frac{3}{8}$, $\frac{1}{4}$, $\frac{1}{8}$ and 1 in., per pair.....
Straight Crimping Rolls, per pair.....
Extra for Foot Treadle Attachment in place of Crank Screw.....
Extra for Floor Standard in place of regular Standard,.....

Crimping Rollers is not regular equipment with above Beading Machines.

CAPACITY NO. 20 GAUGE IRON AND LIGHTER

Number	617	619
Depth of Throat to Frame, ins.....	13	7 $\frac{1}{2}$
Depth of Throat to Gauge, ins.....	12	6 $\frac{1}{2}$
Distance between shaft centers, ins.....	2 $\frac{5}{8}$	2 $\frac{1}{4}$
Diameter of Rolls, ins.....	2 $\frac{1}{4}$	2 $\frac{1}{8}$
Width of Rolls, ins.....	1 $\frac{1}{8}$	1 $\frac{1}{4}$
Ratio of Gearing.....	3 $\frac{1}{3}$ to 1	2 $\frac{1}{2}$ to 1
Size of Single Bead in Rolls, ins.....	$\frac{3}{8}$	$\frac{1}{2}$
Size of Ogee Bead in Rolls, ins.....	1	$\frac{1}{2}$
Size of Triple Bead in Rolls, ins.....	1	$\frac{1}{2}$
Shipping Weight, approx. lbs.....	140	85

Price with three pairs of regular Rolls and Wedge Bench Standard.....

Note.—Wedge Bench Standard is furnished regularly but extra heavy Improved Standard, No. 978, or Floor Standard, can be fitted when so ordered.

Note.—When ordering special Single Bead Rolls, sketches showing the depth of bead required must be submitted. - Also mention gauge of material to be used or submit sample.

PEXTO SHEET METAL WORKING MACHINES

BEADING MACHINES

STOWS PATENT

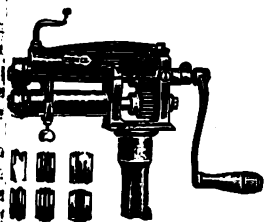


FIG. 856

These machines are popular with the trade and are constructed with re-inforced Frames and Caps. They are well known for their long wearing qualities and well suited for accurate beading up to their full rated capacity.

Number	EXTRA ATTACHMENTS	
	620	621
Extra Regular Beading Rolls, per pair.....
Special Single Bead Rolls, $\frac{1}{4}$, $\frac{5}{16}$, $\frac{3}{8}$, $\frac{1}{2}$ in. per pair.....
Straight Crimping Rolls, per pair.....
Extra Guide Rests, each.....
Extra Standards.....
Special Rolls.....

Note.—When ordering special Single Bead Rolls, sketches showing the depth of Bead required must be submitted. Also mention gauge material to be used or submit samples.

Crimping Rollers is not regular equipment with above Beading Machines.

Note.—No. 620 is furnished with four pairs rolls; one pair each Ogee $\frac{3}{4}$ inch, Triple $\frac{5}{8}$ inch, Triple Coffee Pot $\frac{1}{2}$ inch and Single $\frac{1}{8}$ inch. No. 621 is furnished with five pairs rolls; one pair each Ogee $\frac{1}{4}$ inch, Triple Coffee Pot $\frac{3}{8}$ inch, Double $\frac{1}{2}$ inch, Astragal $\frac{1}{4}$ inch and single $\frac{1}{8}$ inch. Improved Standard No. 975 is furnished.

CAPACITY NO. 26 GAUGE IRON AND LIGHTER

Number	620	621
Depth of Throat to Frame, ins.....	6 $\frac{1}{4}$	4 $\frac{3}{4}$
Depth of Throat to Gauge, ins.....	5 $\frac{1}{2}$	4
Diameter of Rolls, ins.....	1 $\frac{1}{8}$	1 $\frac{1}{2}$
Width of Rolls, ins.....	1 $\frac{1}{8}$	1
Distance between Shaft Centers, ins.....	1 $\frac{3}{8}$	1 $\frac{1}{8}$
Shipping Weight, approx. lbs.....	50	40
Price with standard.....	.....	.....

CRIMPING AND BEADING MACHINE

FOR FACILITATING THE PUTTING TOGETHER OF PIPE

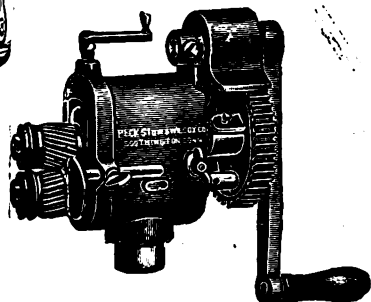


FIG. 857

These machines have been designed with a view to giving maximum strength and rigidity and can be depended upon for producing snug fitting pipe joints that hold when put together. On the Cornice Maker's, rolls are attached to arbors in a manner that leaves the ends or faces of the rolls flat or making them adapted for crimping close up to a bend or angle and are constructed for crimping.

CORNICE MAKERS CRIMPER

FOR FACILITATING THE PUTTING TOGETHER OF PIPE AND GENERAL CRIMPING

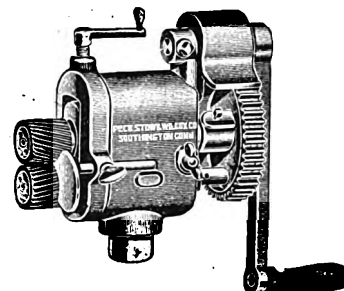


FIG. 858

NOS. 585, 586 WITH CRANK SCREW. NOS. 587, 588 WITH FOOT TREADLE ATTACHMENT LESS CRANK SCREW.
CAPACITY NO. 20 GAUGE IRON AND LIGHTER

Number	585	586	587	588
Diameter Beading Rolls.....ins.	1 $\frac{1}{8}$	1 $\frac{1}{8}$	1 $\frac{1}{8}$	1 $\frac{1}{8}$
" Crimping Rolls..... "	1 $\frac{1}{8}$	1 $\frac{1}{8}$	1 $\frac{1}{8}$	1 $\frac{1}{8}$
Width Crimp Rolls..... "	1 $\frac{3}{4}$	1 $\frac{3}{4}$	1 $\frac{3}{4}$	1 $\frac{3}{4}$
" Bead Rolls..... "	1	1	1	1
Size of Bead Ogee..... "	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$
Ratio Gearing.....	3:1	3:1	3:1	3:1
Distance between Shaft Centers.....ins.	1 $\frac{3}{4}$	1 $\frac{3}{4}$	1 $\frac{3}{4}$	1 $\frac{3}{4}$
Shipping Weight.....lbs.	65	65	85	85

Price complete with Standard and one pair Blank Collars to substitute one Beading Rolls when crimping alone is desired.....

NOTE: These machines are adjustable for two speeds, geared for heavy work and may be run direct drive on light iron. No. 585 has spiral crimping rolls, No. 586 has straight crimping rolls.

NOS. 591, 592 WITH CRANK SCREW. NOS. 593, 594 WITH FOOT TREADLE ATTACHMENT LESS CRANK SCREW

CAPACITY NO. 20 GAUGE IRON AND LIGHTER

Number	591	592	593	594
Diameter Crimping Rolls.....ins.	1 $\frac{1}{8}$	1 $\frac{1}{8}$	1 $\frac{1}{8}$	1 $\frac{1}{8}$
Width Crimp Rolls..... "	1 $\frac{3}{4}$	1 $\frac{3}{4}$	1 $\frac{3}{4}$	1 $\frac{3}{4}$
Ratio Gearing.....	3:1	3:1	3:1	3:1
Distance between Shaft Centers.....ins.	1 $\frac{3}{4}$	1 $\frac{3}{4}$	1 $\frac{3}{4}$	1 $\frac{3}{4}$
Shipping Weight.....lbs.	63	63	83	83

Price complete with Standard.....

No. 591 has spiral crimping rolls, No. 592 has straight crimping rolls.

These machines are adjustable for two speeds, geared for heavy work and may be run direct drive on light iron.

PEXTO SHEET METAL WORKING MACHINES

ADJUSTABLE GUTTER BEADER

NO. 700



FIG. 861

Gutter Beaders are intended for forming a bead on the edge of gutter. This Machine is so constructed that it can be easily adjusted to be used with Rods from $\frac{3}{8}$ to $\frac{1}{2}$ inch in diameter. The thickness of the metal is determined by the size of the Rod. It has a Gauge or Stop on the left-hand end, so that after adjusting the jaws and setting the Gauge for the size of the Rod to be used the Jaws can be easily opened to remove the work and Rod, and then closed to exactly the same position as when the bead was formed so that the operator can form any number of beads of exactly the same size. The Jaws are adjusted by a Hand Wheel with Rack and Pinion which adjusts both ends of the movable Jaw.

Number	700
Length.....ins.	31
Shipping Weight.....approx. lbs.	75
Price complete with one Rod $\frac{3}{8}$ to $\frac{1}{2}$ inch in diam. as may be ordered.....	

Where specifications do not accompany orders, $\frac{1}{2}$ inch rod will be sent.

RAPID CRIMPING AND BEADING MACHINE

CAPACITY NO. 24 GAUGE IRON AND LIGHTER

NO. 602

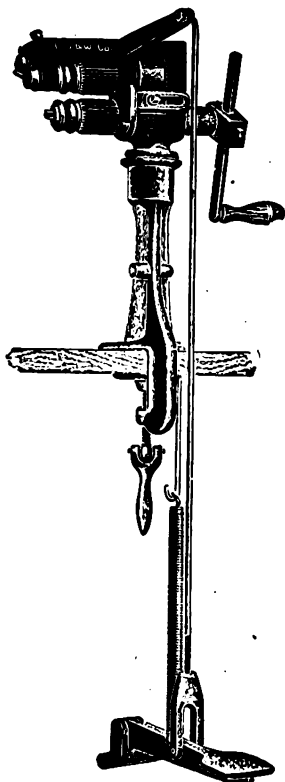


FIG. 859

Actual tests have demonstrated that for crimping or beading Stove Pipe, Elbows, Furnace Pipe, etc., this type of machine is vastly superior to any other built for the purpose. The construction throughout is exceedingly strong and rigid, and permits of easy and rapid adjustment.

The depression of rolls is accomplished by a foot treadle. The contact of the upper Beading Roll is adjusted by a lever and this lever also gives an independent adjustment for raising upper Beading Roll, taking same out of contact with lower roll, in case crimping only is desired. The adjustment of this lever is affected by means of an eccentric device, and is handy and practically instantaneous in its action. The application of this feature greatly increases the simplicity of this machine, as the operation of crimping alone can be performed without substituting blank collars for beading rolls. The crank is adjustable to suit light or heavy work.

Shipping Weight, approx. lbs. 38
Price complete with Standard ..

STOVE PIPE CRIMPER

CAPACITY NO. 24 GAUGE IRON AND LIGHTER

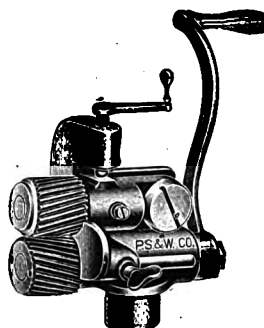


FIG. 860

These machines are intended for light work, but are built strongly and run very smoothly. They are intended for crimping only.

Number 589 0589

Ship. Wt. approx. lbs. 24 24

Price with Standard

No. 589 has Spiral Crimping Rolls. No. 0589 has Straight Crimping Rolls.

SETTING DOWN MACHINE

WITH INCLINED FACES. FOR SETTING DOWN SEAMS PREPARATORY TO DOUBLE SEAMING AND FOR CLOSING SEAMS IN OTHER WORK



FIG. 870

The improvements in Pexto Pattern Setting Down Machines adapt them for setting down the seams on differently shaped vessels to better advantage than any other design. The inclined position of both upper and lower faces allows work to be held up or down and seams to be started inward while setting down, thereby facilitating the operation of double seaming. Adjustable Gauges with Idler Rollers are fitted.

Number	561	562
Capacity Gauge Iron and Lighter, No.....	24	18
Ratio of Gearing.....		2 to 1
For seams up to, ins.....	$\frac{3}{8}$	$\frac{1}{2}$
Shipping Weight, approx. lbs.....	50	100
Price with Standard.....		
Price without Standard.....		

Note.—Extra heavy standard No. 977 is furnished.

PEXTO SHEET METAL WORKING MACHINES

WIRING MACHINE

COLUMBIAN PATTERN. NO. 525

FOR WORKING METAL AROUND WIRE AFTER THE SEAT HAS BEEN PREPARED WITH THE TURNING MACHINE

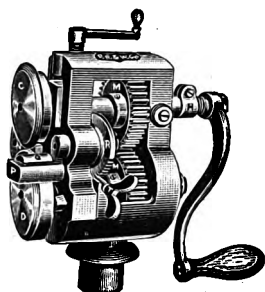


FIG. 862

A wiring Machine with solid frame that for a great many years through severe tests in the hands of practical sheet metal workers has won for it a reputation placing it in a class by itself. It may be depended upon to hold its own whether the job to be turned out is large or small.

CAPACITY NO. 22 GAUGE IRON AND LIGHTER

Number	525	525½
Diameter of Rolls.....ins.	3	3
Will receive wire up to diameter....."	$\frac{5}{16}$	$\frac{5}{16}$
Weight.....lbs.	31	20
Price with Standard.....	....	....
" without Standard.....	....	....

Regular Offset Wiring Standard No. 976.

WIRING MACHINES

STOW'S ENCASED PATTERN—NOS. 526 AND 526½

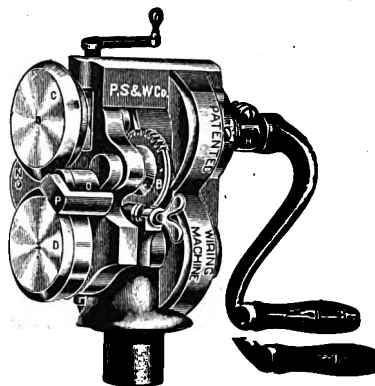


FIG. 863

CAPACITY NO. 24 GAUGE IRON AND LIGHTER

Stows Encased Wiring Machines have been tried and proven by the most exacting mechanics for many years as the most practical and efficient for general use on light work. They may be depended upon to give the very best of good service and operate with accuracy.

Number	526	526½
Diameter of Rolls.....ins.	3	3
Will receiver wire up to diameter....."	$\frac{5}{16}$	$\frac{5}{16}$
Weight.....lbs.	28	17
Price with Standard.....	....	....
Price without Standard.....	....	....

Regular Offset Wiring Standard No. 976 is furnished.

HEAVY TURNING AND WIRING MACHINES.

NO. 547 SERIES

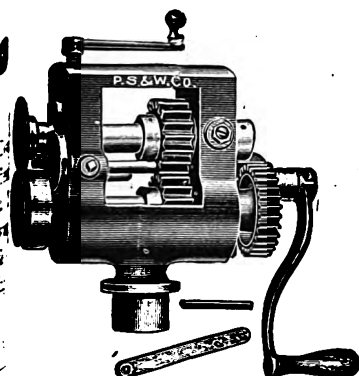


FIG. 864

These machines are made from heavy patterns and with the proper rolls and gauges they are suited for a variety of operations. Machine cut steel connecting gears are used and the driving gears are cut from solid cast iron. Frames are extra heavy and the machine throughout is proportioned for giving the very best of good satisfaction up to the full rated capacity.

CAPACITY NO. 18 GAUGE IRON AND LIGHTER

Number	Hand Turning 547	Hand Wiring 548	Power Wiring 547½	Power Wiring 548½
Diameter of Rolls, ins.	3¼	3¼	3¼	3¼
Ratio of Gearing.....	2 to 1	2 to 1	2 to 1	2 to 1
Size of Pulley.....ins.			12x2½	12x2½
Speed of Pulley.....R. P. M.			60	60
Smallest diameter of wire that can be used.....ins.	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$
Largest diameter of wire that can be used.....ins.	$\frac{1}{4}$	$\frac{1}{4}$	$\frac{1}{4}$	$\frac{1}{4}$
Shipping Weight, approx. lbs.	115	115	155	155
Price with one set of Rolls and Standard				

EXTRA ATTACHMENTS

Regular Turning, Wiring and Burring Rolls....	Per Pair.....
Elbow Edging Rolls.....	" ".....
Extra Regular Gauges.....	Each.....
Apron Gauges for Elbow Edging Rolls.....	" ".....
Foot Treadle Attachment in place of Crank Screw.....	Complete.....
Circular Flanging Attachment.....	" ".....

NOTE—Where specifications do not accompany orders Turning Machines will be furnished with Turning Rolls for $\frac{1}{8}$ inch Wire and No. 20 Gauge Iron regularly. Extra Heavy Standard No. 977 is furnished. Nos. 547½-548½ Turning and Wiring Machines are constructed for power and fitted with Tight Pulley. Rolls are interchangeable.

PEXTO SHEET METAL WORKING MACHINES

SETTING DOWN MACHINES COLUMBIAN PATTERN

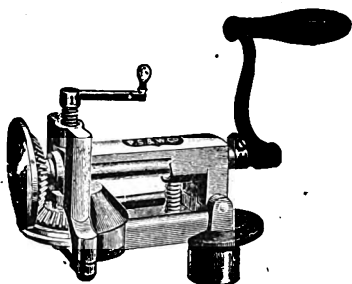


FIG. 867

CAPACITY NO. 24 GAUGE IRON AND LIGHTER

Number	555	555½	556	556½
For seams up to, ins.....	⅜	⅜	⅞	⅞
Shipping Weight, approx. lbs...	21	10	23	12
Price with Standard.....				
Price without Standard.....				

Regular Offset Standard No. 975, is furnished.

BURRING MACHINES COLUMBIAN PATTERN

FOR BURRING OR FLANGING BOTTOMS AND BODIES
OF VESSELS, ETC.

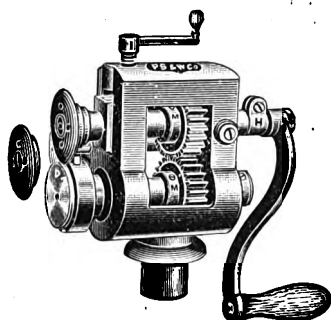


FIG. 869

CAPACITY NO. 22 GAUGE IRON AND LIGHTER

Burring Machines in open pattern with solid frame of improved design well known for their splendid wearing qualities, accuracy and ease of operation. The rolls are forged from special high grade material giving extreme wearing qualities to the fine edge in the rolls necessary to produce a satisfactory uniform flange on a number of blanks.

Number	Small 576	Small 576½	Large 577	Large 577½
Diameter of Rolls, ins.....	1½	1½	2½	2½
Widest flange or burr that can be turned, ins.....	⅞	⅞	¼	¼
Weight, lbs.....	21	10	25	14
Price with one extra upper roll and standard.....				
Price with one extra upper roll without standard.....				

Regular Offset Standard No. 975 is furnished.

TURNING MACHINES STOW'S ENCASED PATTERN

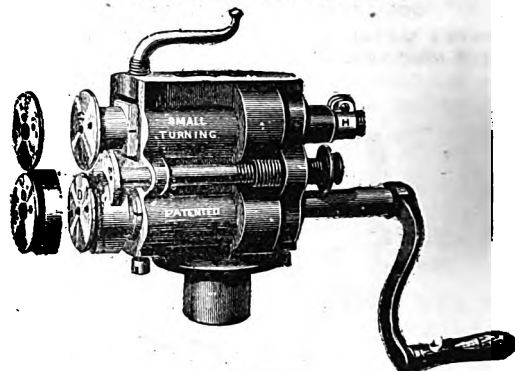


FIG. 866

CAPACITY NO. 24 GAUGE IRON AND LIGHTER

A Bench Turning Machine in encased pattern, designed for meeting the requirements of the most exacting user. The largest tinware manufacturers and sheet metal workers having use for a light, easy operating Turning Machine prefer these patterns over any other.

Number	Small. 545	Small. 545½	Large. 546	Large. 546½
Diameter of Rolls, ins.....	2⅞	2⅞	3	3
Smallest diam. of wire that can be used, ins.....	⅜	⅜	⅞	⅞
Largest diam. of wire that can be used, ins.....	¼	¼	⅞	⅞
Shipping Weight, approx. lbs.	23	12	28	17
Price with one extra pair of thick Turning Rolls and Standard.....				
Price with one extra pair of thick Turning Rolls without Standard.....				

Regular Offset Standard No. 975 is furnished.

BURRING MACHINES STOW'S ENCASED PATTERN

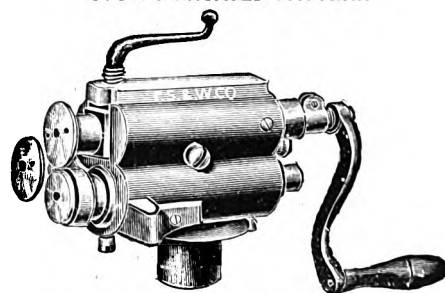


FIG. 868

CAPACITY NO. 24 GAUGE IRON AND LIGHTER

Burring Machines of encased pattern are typical of the complete line of the well known Pexto Encased Bench Machines. No important feature is overlooked for making them the best and most serviceable machines made.

Number	Small. 579	Small. 579½	Large. 580	Large. 580½
Diameter of Rolls, ins.....	1½	1½	2½	2½
Widest flange or burr that can be turned, ins.....	⅞	⅞	¼	¼
Weight, lbs.....	21	10	23	12
Price with one extra upper roll and standard.....				
Price with one extra upper roll without standard.....				

Regular Offset Standard No. 975 is furnished.

PEXTO SHEET METAL WORKING MACHINES

TURNING MACHINES

COLUMBIAN PATTERN NO. 540 SERIES

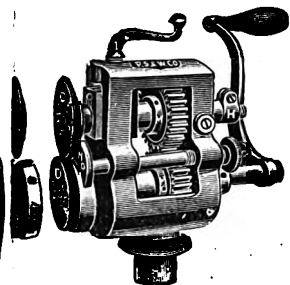


FIG. 865

CAPACITY NO. 22 GAUGE IRON AND LIGHTER

Number	Extra Small 540	Extra Small 540½	Small 541	Small 541½	Large 542	Large 542½
Diameter of Rolls						
.....ins.	1½	1½	2¼	2¼	3	3
Smallest diam. of wire that can be used.....ins.	⅜	⅜	⅜	⅜	⅜	⅜
Largest diam. of wire that can be used.....ins.	¼	¼	¼	¼	⅜	⅜
Shipping Weight approx. lbs....	22	1	25	14	31	20

Price with one extra pair of thick Turning Rolls and Standard.....
 Price with one extra pair of thick Turning Rolls without Standard.....

Regular Offset Standard No. 975 is furnished.

A HIGHLY serviceable Turning Machine with solid open frame of the highest grade of excellence. The tinsmith or sheet metal worker will find in these patterns every modern improvement combined with the highest quality materials.

ELBOW EDGING MACHINE

COLUMBIAN PATTERN

FOR EDGING ELBOW SECTIONS

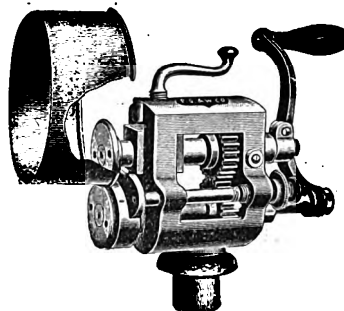


FIG. 871

CAPACITY NO. 22 GAUGE IRON AND LIGHTER

Illustration shows an elbow section in process of edging. The corresponding section is edged over the lower roll. Special Elbow Edging Rolls quoted on application.

Number	550	551
Diameter of Rolls, ins.....	1½	2¼
Shipping Weight, approx. lbs.....	21	25
Price with one set Elbow Edging Rolls in either of eight types and Standard.....		
Price without Standard.....		

Note.—Where specifications do not accompany orders, rolls in design No. 1 will be furnished regularly. Furnished with regular Offset Standard No. 975.

EXTRA ATTACHMENTS

Price extra Elbow Edging Rolls in design 1 to 8, per pair.....	
Price Treadle Attachment in place of Crank screw.....	
“ Apron Gauges for Elbow Edging Rolls.....	
“ Tight Pulley with Shaft extended for power extra.....	

MACHINE STANDARDS



FIG. 872

REGULAR OFFSET NO. 975



FIG. 873

WIRING OFFSET NO. 976

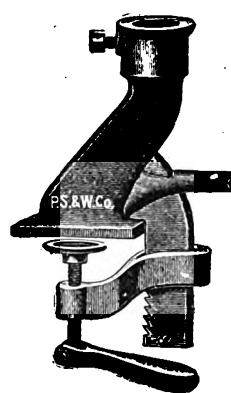


FIG. 874

EXTRA HEAVY STANDARDS NOS. 977-978

Offset Standards Nos. 975-976 are now furnished with the regular Columbian and Encased Pattern bench machines. Extra heavy Standard No. 977 is regularly furnished with the No. 562 Setting Down Machine and heavy Wiring, Turning, Elbow Edging and Burring Machines. Standard No. 978 is intended for use with No. 617A series Beading Machines and is furnished, in place of Edge Standard packed with these machines regularly, only when specified.

Number	975	976
Size of Hole, ins.....	1⅝	1⅝
Height overall from bench, ins.....	9¾	9¾
Shipping Weight, lbs.....	10½	11
Price, each.....		

Number	977	978
Size of Hole, ins.....	2¼	2½
Shipping Weight, lbs.....	23	24
Price.....		

PEXTO SHEET METAL WORKING MACHINES

HOLDALL REVOLVING MACHINE STANDARD

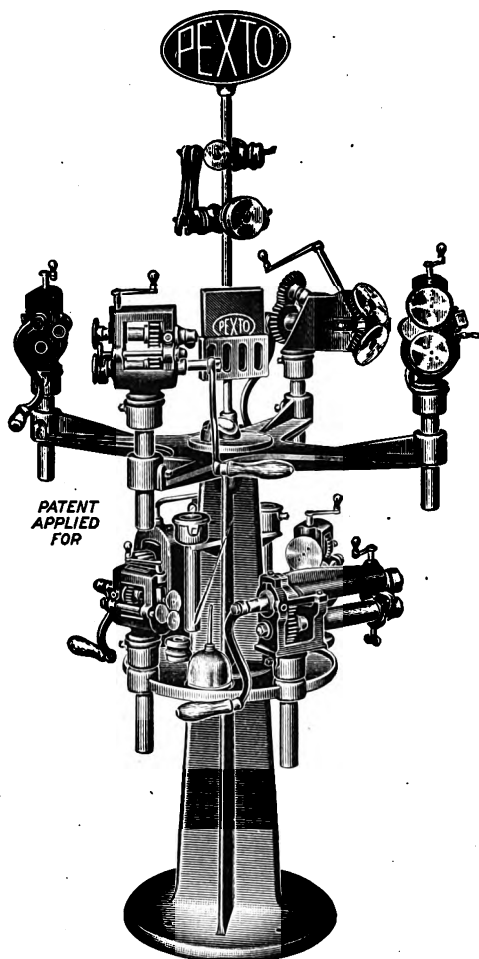


FIG. 875

REVOLVING MACHINE STANDARD NO. 969 WITH MACHINES

FEATURES

No. 1—A place for everything and everything in its place. How many times have you delayed that rush job owing to misplacing a roll you could not find when needed the most or how much valuable time have you consumed in locating a face wrench at each time it was necessary to change a roll.

No. 2—A Revolving Turret holding four machines. Four operations can be completed without changing positions. Four machines always ready for action and to be found in good condition when their use is required. Designed with ample room for accommodating from one to four operators.

No. 3—Hand Lever for holding Revolving Turret in a fixed stationary position.

No. 4—Adjustable Machine Holders that raise, lower and swivel for suiting operating convenience of machines for the short and tall operator as well as the work in process. Working away from the Standard with approximately forty inches more or less (according to adjustment of Machine Holder) from the floor to working edge of rolls of machine is a direct advantage in working large members, a recognized feature not to be found in the old machine standard used on a wooden bench of a fixed height.

No. 5—Lower Stationary Turret for holding four additional machines arranged for quickly interchanging with any machine set in upper Revolving Turret. This Lower Turret also provides

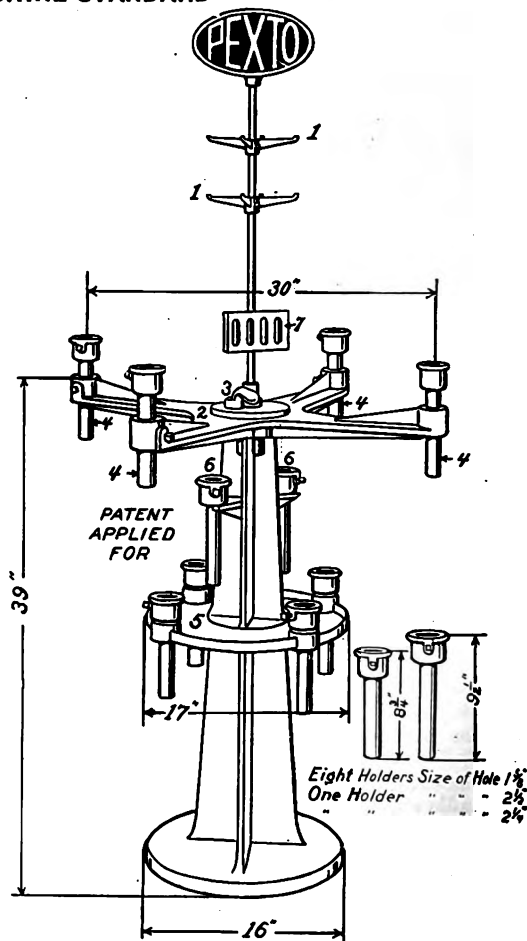


FIG. 876

REVOLVING MACHINE STANDARD NO. 969 WITHOUT MACHINES

or a handy shelf holding oil can, tools, etc. which are used in connection with equipment mounted.

No. 6—Two additional reserve Machine Posts out of the way supported on brackets to hold any large bench machine that will not fit in Holders provided for the smaller machines. Ten Posts in all go with each Standard.

No. 7—A handy Rack for holding Pexto Catalogue—book that every worker in tin and sheet metal should have near him for quick reference. Its pages include valuable reference tables and most important of all it shows every Pexto Tool and Machine for the Metal Worker with a full description of each and an outline of the work it does and the way it does it.

Every shop is cramped for bench room while floor space is always available.

Using this modern method of Bench Machine operation you receive the direct benefit of all features described above in a Revolving Standard that will receive eight of any bench machines that now fit in the old fashioned bench machine standard. This modern Standard with eight machines utilizing a floor space of only thirty inches in diameter.

Wherever installed the practice of taking down and putting up machines many times a day—throwing them under the bench when it is desired to utilize bench room for some other purpose, only to find some part broken when you wish to use them again—is a true condition in the average shop which the Holdall Revolving Machine Standard entirely eliminates. No. 969 Standard only, weight 268 lbs. Price.....

PEXTO SHEET METAL WORKING TOOLS

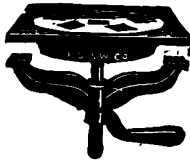
CAST IRON BENCH PLATE



FIG. 877

Number	980	981	982
Length.....ins.	48	37½	30
Width....."	12	8	8
Weight.....lbs.	85	46	31
Price.....	..	..	..

REVOLVING BENCH PLATE

IMPROVED, POLISHED
FIG. 878

This Bench Plate is so made that it can be readily inserted in any bench of ordinary thickness, and revolves so that different tools may be used in the same position.
No. 983—8¾ x 8¾ in., Weight Each About 18 Lbs.
Price Each.....

UNIVERSAL STAKE HOLDER WITH WROUGHT IRON AND STEEL FACE STAKES

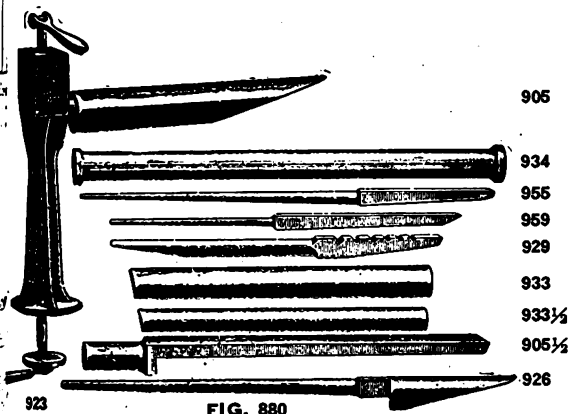


FIG. 880

The illustration above represents the improved Stake Holder and the different Tools capable of being used with it.

This Holder enables the workman to use the Stakes shown, in any position best suited to the work in hand, without mutilating the bench. One stake may be substituted for another with ease. It is convenient, solid, substantial and will give satisfaction.

When ordering these Stakes other than in full sets be careful to mention "For use in Stow's Stake Holder," to avoid

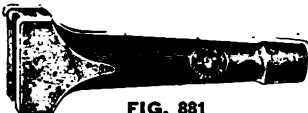
confusion with the regular Stakes. The set is made up as follows:

Stake Holder, only (923).....	Weight 21	lbs....	Price Each
Beakhorn for Stake Holder, two pieces (905) (905½).....	" 47	"	"
Blowhorn for Stake Holder (926).....	" 10	"	"
Creasing and Horn for Stake Holder (929).....	" 8	"	"
Double Seaming for Stake Holder (934).....	" 23	"	"
Conductor for Stake Holder, two pieces (933) (933½).....	" 26	"	"
Candle Mould for Stake Holder (955).....	" 4½	"	"
Needle case for Stake Holder (959).....	" 4	"	"
No. 964—Full set as above, complete, with Stake Holder.....	Weight 145 lbs....	Price Per Set	

EXTRA PARTS

Round End for Beakhorn Stake (905).....	Weight 31 lbs....	Price Each
Flat End for Beakhorn Stake (905½).....	" 16 " "
Large End for Conductor Stake (933).....	" 16 " "
Small End for Conductor Stake (933½).....	" 10 " "
Screw and Bolt for Stake Holder.....		"
Nut for Stake Holder.....		"

GROOVING TOOLS

FIG. 881
HAND GROOVER

Number	0000	000	00	0	1	2	3	4	5	6	7	8
Size of Groove.....ins.	1½	1½	1½	¾	1½	1½	1½	1½	1½	1½	1½	1½
Weight.....lbs.	1/10	1/10	1/10	1/10	1/10	1/10	1/10	1/10	1/10	1/10	1/10	1/10
Price.....ea.	..	..	..	..	..	..	..	..	..	..	..	..

PEXTO Hand Groovers are forged from a special, tough, high-grade steel, scientifically hardened. Heads are highly polished. They are known the country over as being of the highest grade of excellence and the Tinsmith or Sheet Metal Worker who does not use them in preference to all others is the exception and not the rule.

PEXTO SHEET METAL WORKING TOOLS

SOLID MANDREL CAST IRON WITH POLISHED FACES



FIG. 882

No.	Length inches	Dia. inches	Weight lbs.	Price each
960	61	3 $\frac{3}{8}$	128	
960 $\frac{1}{2}$	40	3	86	
961	34 $\frac{1}{2}$	2 $\frac{3}{4}$	56	
962	30	2 $\frac{1}{4}$	43	
963	27 $\frac{1}{2}$	2 $\frac{1}{4}$	30	
x 967	30	....	34	

x 967 is extra small; for pipe small as 2-inches.

HOLLOW MANDRELS

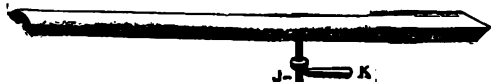


FIG. 883

No.	Length	Weight	Radius of circle	Each
910	40 in.	60 lbs.	2 in.	
911	60 in.	108 lbs.		

BEAKHORN STAKES WROUGHT IRON WITH STEEL FACES

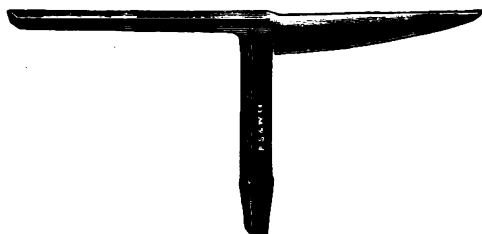


FIG. 884

No.	Length of ends, inches	Weight lbs.	Price each
	Round	Flat	
901	16 $\frac{1}{2}$	21 $\frac{1}{2}$	46
902	16 $\frac{1}{2}$	20	37
904	14	19	27

BLOWHORN STAKES WROUGHT IRON WITH STEEL FACES

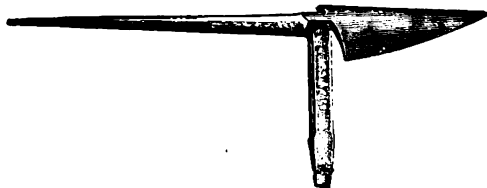


FIG. 885

Length, large end 9 in.; small end 18 in.; diameter small end, at wide point 1 $\frac{1}{2}$ in. at narrow point $\frac{3}{8}$ in.; diameter large end at wide point 4 $\frac{1}{4}$ in.; at narrow point $\frac{1}{2}$ in.
No. 925 Weight 14 lbs. Each.....

NEEDLE CASE STAKE WROUGHT IRON WITH STEEL FACES



FIG. 890

Length round end 10 $\frac{1}{2}$ in.; flat end 8 in.; width flat end 1 in. Round end tapers from $\frac{1}{8}$ to $\frac{1}{16}$ in.
No. 957 Weight 4 lbs. Each.....

BEVEL EDGE SQUARING STAKES

Wrought Iron With Steel Faces.

No.	Size of Face inches	Weight lbs.	Price Each
931	3 x 5	16	
932	2 $\frac{1}{2}$ x 4 $\frac{1}{2}$	14	

FIG. 891

COPPERSMITHS' SQUARE STAKE WROUGHT IRON WITH STEEL FACES

No. 935, Size of face 2 $\frac{3}{4}$ x 4 $\frac{1}{2}$ inches.
Weight 11 lbs. Price each.....

FIG. 892

SQUARE STAKES WROUGHT IRON WITH STEEL FACES

No.	Size of Face inches	Weight lbs.	Price Each
936	2 $\frac{3}{4}$ x 4 $\frac{1}{2}$	11	
938	3 $\frac{1}{2}$ x 5	14	
939	1 $\frac{1}{4}$ x 2 $\frac{1}{2}$	3	

FIG. 893

HATCHET STAKES WROUGHT IRON WITH STEEL FACES



FIG. 894

No.	Blade, Length inches	Blade, Center, inch s	Blade, Ends, inches	Weight lbs.	Price Each
941	16	2 $\frac{1}{2}$	1 $\frac{5}{8}$	14	
942	14 $\frac{1}{2}$	2 $\frac{3}{8}$	1 $\frac{1}{2}$	11	
943	13	2 $\frac{1}{8}$	1 $\frac{1}{4}$	8 $\frac{1}{2}$	
944	11	2 $\frac{1}{8}$	1 $\frac{3}{8}$	6 $\frac{1}{2}$	
945	9	1 $\frac{1}{2}$	1	4	
946	7	1 $\frac{3}{8}$	1	3	

PEXTO SHEET METAL WOKING TOOLS

CREASING STAKES WROUGHT IRON WITH STEEL FACES

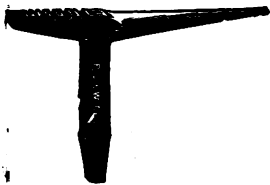


FIG. 886

No. 927—CREASING STAKE,
WITH HORN



FIG. 887

No. 928—CREASING STAKE,
PLAIN

No. 927 measures 12 in. on round end and 6¾ in. on flat end, round end tapering from 1½ to ⅞ in. No. 928 is 15 in. over all.

No.	Weight	Each
927	12 lbs.	.....
928	11½ lbs.	.....

CONDUCTOR STAKES CAST IRON WITH POLISHED FACES

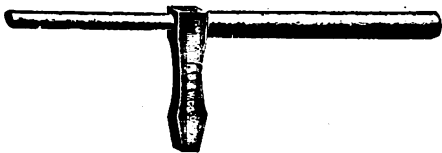


FIG. 888

No.	Length of ends, inches		Dia. of ends, inches		Weight lbs.	Price Each
	Large	Small	Large	Small		
949	15	11½	2¼	1¾	28	.....
950	14	10½	1¾	1¼	17	.....

CANDLE MOULD STAKE WROUGHT IRON WITH STEEL FACES



FIG. 889

Length, large end 18½ in.; small end 9½ in. Small end tapers from 1¼ to ½ in.; large end tapers from ⅞ to ½ in.

No.	Weight	Each
921	7½ lbs.	.....
922	7½ lbs.	.....

ROUND HEAD STAKE CAST IRON WITH POLISHED FACES



FIG. 895

Length head 12½ in.; diameter head 3 in.
No. 965 Weight 9½ lbs. Each.....



FIG. 896

BOTTOM STAKES WROUGHT IRON WITH STEEL FACES

No.	Length overall inches	Width across top, inches	Weight lbs.	Price Each
951	13½	1¾	3	.....
952	13½	1½	2¾	.....
953	13½	1⅞	2	.....
954	13½	1	1¾	.....

DOUBLE SEAMING STAKE CAST IRON WITH POLISHED FACES

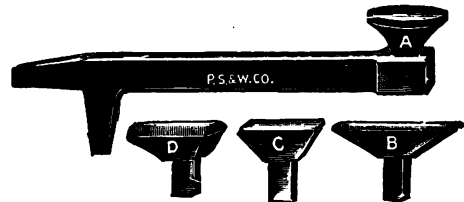


FIG. 897

With four heads. For dimensions of heads, see below.
No. 949 Weight 110 lbs. Each.....

DIMENSIONS OF HEADS

No.	Size	Length to top of standard
A	6 in. diameter	4¼ in.
B	8½ x 2½ x 3¼ in.	2½ in.
C	5½ x 4½ in.	2½ in.
D	5¾ x 4¼ x 3¾	2¾ in.

DOUBLE SEAMING STAKE WROUGHT IRON WITH STEEL FACES

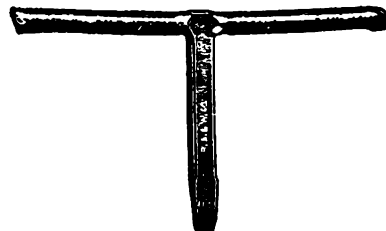


FIG. 898

No. 921, length large end 17 in.; small end 12 in. No. 922, each end 11 in. Diameter both numbers 1¼ in.

No.	Weight	Each
921	37 lbs.	.....
922	30 lbs.	.....

CINCH ANCHORING SPECIALTIES

STRONGER THAN THE STRONGEST BOLT

The Cinch Anchoring Specialties are three in number—Cinch Expansion Bolts, Cinch Anchors and Cinch Stud Anchors. They differ from each other only in the kind of bolt that is used, the position in which the bolt is installed or the order in which the parts of the Cinch anchorage are used.

Cinch anchoring devices give the only anchorage guaranteed to hold beyond the tensile and shearing strength of any wrought iron or steel bolt as well as the breaking strength of the nut. They will not crush or otherwise mar the face of masonry. Vibration will not loosen the grip of the anchorage.



CINCH EXPANSION BOLT
INSTALLED
FIG. 1876



CINCH ANCHOR
INSTALLED
FIG. 1877



CINCH STUD ANCHOR
INSTALLED
FIG. 1878

CUT DRILLING COSTS

Cinch anchoring devices require a hole of less depth than any other expansion device, affording a great saving of labor and time in drilling and a substantial saving of material, because of the shorter length of bolt needed.

EASY TO INSTALL IN ANY POSITION

Cinch anchoring devices are easy to install in any position. They can be set in masonry with the head of the bolt out of or into the hole. When the latter method is followed, expansion can be completed before work is lifted into place and bolted fast.

TWO-UNIT ANCHORAGE



PLAIN
FIG. 1880



THREADED
FIG. 1879

Use two units for anchorage of ordinary strength. Below is listed price per hundred two-unit anchorages consisting of four pieces, two iron and two lead alloys, without bolts, units, either plain or threaded.

PRICE LIST

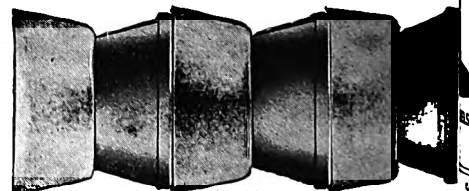
Diameter of bolts.....inch	$\frac{1}{8}$	$\frac{1}{4}$	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{3}{4}$	1	1½
Min. Depth of Holes..... "	$\frac{7}{8}$	$1\frac{1}{8}$	$1\frac{1}{4}$	$1\frac{1}{2}$	$1\frac{3}{4}$	2	$2\frac{1}{2}$
Diam. of Holes..... "	$\frac{1}{2}$	$\frac{5}{8}$	$\frac{3}{4}$	$\frac{7}{8}$	1	$1\frac{1}{4}$	$1\frac{3}{4}$
Price.....*per 100 sets	\$7.00	\$8.00	\$9.00	\$11.00	\$15.00	\$18.00	\$24.00

Diameter of Bolts.....inches	$\frac{3}{4}$	1	1½	2	2½	3	3½
Min. Depth of Holes..... "	$2\frac{1}{2}$	$2\frac{3}{4}$	$3\frac{1}{4}$	$4\frac{1}{2}$	$5\frac{1}{4}$	$6\frac{1}{4}$	$7\frac{1}{4}$
Diam. of Holes..... "	$1\frac{1}{2}$	$1\frac{3}{4}$	$2\frac{1}{4}$	2	$2\frac{1}{2}$	$3\frac{1}{4}$	$4\frac{1}{4}$
Price.....*per 100 sets	\$35.00	\$44.00	\$63.00	\$140.00	\$150.00	\$220.00	\$320.00

*Two irons and two leads.

THREE-UNIT ANCHORAGE

Without bolts consists of six pieces: three irons and three leads. Use three-unit anchorage when an anchorage stronger than the bolt is wanted.



PRICE LIST

FIG. 1881

Diameter of Bolt.....inches	$\frac{1}{8}$	$\frac{1}{4}$	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{3}{4}$	1	1½
Min. Depth of Holes..... "	$1\frac{1}{2}$	$1\frac{3}{4}$	$2\frac{1}{4}$	$2\frac{1}{2}$	$3\frac{1}{4}$	$4\frac{1}{2}$	$5\frac{1}{4}$
Diam. Hole & Drill..... "	$\frac{1}{2}$	$\frac{5}{8}$	$\frac{3}{4}$	$\frac{7}{8}$	1	$1\frac{1}{4}$	$1\frac{3}{4}$
Price.....per 100	\$10.50	\$12.00	\$13.50	\$16.50	\$22.50	\$27.00	\$36.00

Diameter of Bolts.....inches	$\frac{3}{4}$	1	1½	2	2½	3	3½
Min. Depth of Holes..... "	$3\frac{3}{4}$	4	$4\frac{7}{8}$	6	$6\frac{1}{4}$	$7\frac{1}{4}$	$8\frac{1}{4}$
Diam. Hole & Drill..... "	$1\frac{3}{8}$	$1\frac{1}{2}$	$1\frac{5}{8}$	2	$2\frac{1}{8}$	$2\frac{3}{4}$	$3\frac{1}{4}$
Price.....per 100	\$52.50	\$66.00	\$94.50	\$210.00	\$225.00	\$330.00	\$440.00

For the price of Cinch Specialties complete with bolts, add our regular price for bolts. Cinch Anchorages are threaded for use with U. S. Standard Threads.

CINCH ANCHORAGE SPECIALTIES METHOD OF INSTALLING

FIRST OPERATION

Insert bolt with first-unit in hole. (A Cinch Anchor is being used here. If a Cinch Stud Anchor were being used, the first unit would be threaded and a Stud Bolt would be used instead of a standard machine bolt.)

SECOND OPERATION

Expand in position as shown by means of a piece of pipe or a special calking tool made for that purpose. Add another plain male part and another alloy female part, expanding the second expansion unit by swedging as before with a piece of pipe or special calking tool, till an anchorage of the desired strength is secured.

NOTE: For Cinch Anchors use square head bolts for all sizes up to and including $\frac{1}{2}$ inch. Beyond $\frac{1}{2}$ inch use hexagon head bolts as holes are too small to receive a square headed bolt; or corners of square head bolts can be filed off to permit free running in holes.



FIG. 1882
FIRST OPERATION

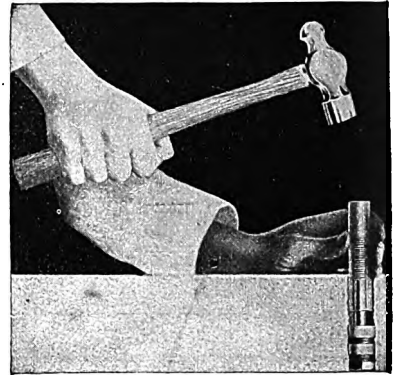


FIG. 1883
SECOND OPERATION



FIG. 1884

CINCH BRAND CALKING TOOLS

FOR EXPANDING CINCH UNITS

Diam. of bolts in.	$\frac{1}{8}$	$\frac{1}{4}$	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{5}{8}$	$\frac{3}{4}$	$\frac{7}{8}$	1
Price.....each	\$.80	1.00	1.20	1.70	3.00	3.60	4.20	6.80

CINCH BRAND FOUR POINT DRILLS

DIMENSIONS OF DRILLS TO USE

Diam. of Bolt.....inches	$\frac{1}{8}$	$\frac{1}{4}$	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{5}{8}$	$\frac{3}{4}$		
Diameter of Drill.. "	$\frac{1}{16}$	$\frac{5}{16}$	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{5}{8}$	$\frac{3}{4}$		
Price per doz., 12 in. long	\$3.75	4.25	4.25	7.50	7.50	10.00	11.50	15.75

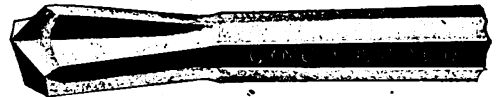


FIG. 1885

ELEVATOR BUCKET BOLTS



BUTTON HEAD
FIG. 1888



CORRUGATED
FIG. 1887



SQUARE SHANK
FIG. 1889



ECLIPSE
FIG. 1890



EXCELSIOR FLAT HEAD
FIG. 1886

LIST PRICE PER HUNDRED

SQUARE SHANK					CORRUGATED & BUTTON			EXCELSIOR FLAT HEAD					ECLIPSE			
Diam.	$\frac{1}{8}$	$\frac{1}{4}$	$\frac{3}{8}$	$\frac{1}{2}$	Diameter	$\frac{1}{8}$	$\frac{1}{4}$	Diameter	$\frac{1}{8}$	$\frac{1}{4}$	$\frac{3}{8}$	$\frac{1}{2}$	Diam.	$\frac{1}{8}$	$\frac{1}{4}$	$\frac{1}{2}$
Length Inches					Length Inches			Length Inches					Length Inches			
$\frac{7}{8}$	\$1.00	\$1.40	\$1.90	\$3.25	$\frac{3}{4}$	\$1.50	\$1.50	$\frac{3}{4}$	\$2.20	\$2.20	\$3.00	\$4.00	$\frac{1}{2}$	\$1.50	\$1.50	....
1	1.00	1.40	1.90	3.25	$\frac{7}{8}$	1.60	1.60	$\frac{7}{8}$	2.30	2.30	3.00	4.00	$\frac{5}{8}$	1.50	1.50	....
$1\frac{1}{4}$	1.00	1.40	1.90	3.25	1	1.60	1.60	1	2.30	2.30	3.00	4.00	$\frac{3}{4}$	....	1.50	....
$1\frac{1}{2}$	1.00	1.40	1.90	3.25	$1\frac{1}{4}$	1.80	1.80	$1\frac{1}{4}$	2.40	2.40	3.20	4.30	1	....	1.60	....
$1\frac{3}{4}$	1.10	1.52	2.06	3.25	$1\frac{1}{2}$	2.00	2.00	$1\frac{1}{2}$	2.50	2.50	3.40	4.60	$1\frac{1}{4}$	....	....	\$1.80
2	1.10	1.52	2.06	3.25	$1\frac{3}{4}$	2.20	2.20	$1\frac{3}{4}$	2.60	2.60	3.60	4.90	....	....	....	....
$2\frac{1}{4}$	1.20	1.64	2.22	3.25	2	2.40	2.40	2	2.70	2.70	3.80	5.20	....	....	....	....
$2\frac{1}{2}$	1.20	1.64	2.22	3.25	....	....	....	....	....	....	....	....	....	....	....	....
3	1.30	1.76	2.38	3.53	....	....	....	....	....	....	....	....	....	....	....	....
$3\frac{1}{2}$	1.40	1.88	2.54	3.81	....	....	....	....	....	....	....	....	....	....	....	....
4	1.50	2.00	2.70	4.09	....	....	....	....	....	....	....	....	....	....	....	....

MACHINE BOLTS

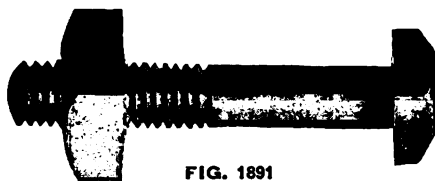


FIG. 1891

SQUARE NUT, SQUARE HEAD, FINISHED POINT AND CUT THREADS

All sizes have U. S. Standard Cut Threads. U. S. Standard Nuts will fit these bolts.
The length of machine bolts is measured under the head to the point.

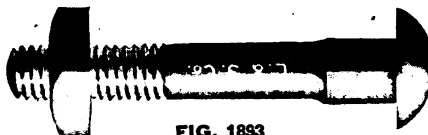
LIST PRICE PER HUNDRED

LIST ADOPTED AUG. 1, 1912

Threads per Inch	Diameter Inch										
	$\frac{1}{4}$	$\frac{5}{16}$	$\frac{3}{8}$	$\frac{7}{16}$	$\frac{1}{2}$	$\frac{5}{8}$ & $\frac{3}{4}$	$\frac{3}{4}$	$\frac{7}{8}$	1	$1\frac{1}{8}$	$1\frac{1}{4}$
Length Inch	20	18	16	14	13	11	10	9	8	..	..
$\frac{3}{4}$	\$1.70	\$2.00	\$2.40	.....	.....	.....	.....	.....	.....	\$22.50	\$30.00
1	1.70	2.00	2.40	\$2.80	\$3.60	\$5.20	\$ 7.70	.....	.....	22.50	30.00
$1\frac{1}{4}$	1.70	2.00	2.40	2.80	3.60	5.20	7.70	.....	.....	22.50	30.00
$1\frac{1}{2}$	1.70	2.00	2.40	2.80	3.60	5.20	7.70	\$10.50	\$15.10	22.50	30.00
$1\frac{3}{4}$	1.78	2.12	2.56	3.00	3.86	5.58	8.25	.....	.....	.....	.....
2	1.78	2.12	2.56	3.00	3.86	5.58	8.25	11.20	16.00	23.70	31.50
$2\frac{1}{4}$	1.86	2.24	2.72	3.20	4.12	5.96	8.80	.....	.....	.....	.....
$2\frac{1}{2}$	1.86	2.24	2.72	3.20	4.12	5.96	8.80	11.90	16.90	24.90	33.00
$2\frac{3}{4}$	.....	2.36	2.88	3.40	4.38	6.34	9.35	.....	.....	.....	.....
3	1.94	2.36	2.88	3.40	4.38	6.34	9.35	12.60	17.80	26.10	34.50
$3\frac{1}{4}$	.....	2.48	3.04	3.60	4.64	6.72	9.90	.....	.....	.....	.....
$3\frac{1}{2}$	2.02	2.48	3.04	3.60	4.64	6.72	9.90	13.30	18.70	27.30	36.00
$3\frac{3}{4}$	.....	.....	3.20	.....	4.90	7.10	10.45	.....	.....	.....	.....
4	2.10	2.60	3.20	3.80	4.90	7.10	10.45	14.00	19.60	28.50	37.50
$4\frac{1}{4}$	.....	.....	3.36	.....	5.16	7.48	11.00	.....	.....	.....	.....
$4\frac{1}{2}$	2.18	2.72	3.36	4.00	5.16	7.48	11.00	14.70	20.50	29.70	39.00
$4\frac{3}{4}$	.....	.....	.....	.....	5.42	7.86	11.55	.....	.....	.....	.....
5	2.26	2.84	3.52	4.20	5.42	7.86	11.55	15.40	21.40	30.90	40.50
$5\frac{1}{2}$	2.34	2.96	3.68	4.40	5.68	8.24	12.10	16.10	22.30	32.10	42.00
6	2.42	3.08	3.84	4.60	5.94	8.62	12.65	16.80	23.20	33.30	43.50
$6\frac{1}{2}$	.....	3.20	4.00	4.80	6.20	9.00	13.20	17.50	24.10	34.50	45.00
7	.....	3.32	4.16	5.00	6.46	9.38	13.75	18.20	25.00	35.70	46.50
$7\frac{1}{2}$	.....	3.44	4.32	5.20	6.72	9.76	14.30	18.90	25.90	36.90	48.00
8	.....	3.56	4.48	5.40	6.98	10.14	14.85	19.60	26.80	38.10	49.50
$8\frac{1}{2}$	.....	.....	.....	.....	7.50	10.90	15.95	.....	.....	.....	.....
9	.....	.....	4.80	5.80	7.50	10.90	15.95	21.00	28.60	40.50	52.50
$9\frac{1}{2}$	.....	.....	.....	.....	8.02	11.66	17.05	.....	.....	.....	.....
10	.....	.....	5.12	6.20	8.02	11.66	17.05	22.40	30.40	42.90	55.50
$10\frac{1}{2}$	.....	.....	.....	.....	8.54	12.42	18.15	.....	.....	.....	.....
11	.....	.....	5.44	6.60	8.54	12.42	18.15	23.80	32.20	45.30	58.50
$11\frac{1}{2}$	.....	.....	.....	.....	9.06	13.18	19.25	.....	.....	.....	.....
12	.....	.....	5.76	7.00	9.06	13.18	19.25	25.20	34.00	47.70	61.50
$12\frac{1}{2}$	.....	.....	.....	.....	9.58	13.94	20.35	.....	.....	.....	.....
13	.....	.....	.....	.....	9.58	13.94	20.35	26.60	35.80	50.10	64.50
14	.....	.....	.....	.....	10.10	14.70	21.45	28.00	37.60	52.50	67.50
15	.....	.....	.....	.....	10.62	15.46	22.55	29.40	39.40	54.90	70.50
16	.....	.....	.....	.....	11.14	16.22	23.65	30.80	41.20	57.30	73.50
17	.....	.....	.....	.....	11.66	16.98	24.75	32.20	43.00	59.70	76.50
18	.....	.....	.....	.....	12.18	17.74	25.85	33.60	44.80	62.10	79.50
19	.....	.....	.....	.....	12.70	18.50	26.95	35.00	46.60	64.50	82.50
20	.....	.....	.....	.....	13.22	19.26	28.05	36.40	48.40	66.90	85.50
21	.....	.....	.....	.....	.....	.....	29.15	.....	50.20	69.30	88.50
22	.....	.....	.....	.....	.....	.....	30.25	.....	52.00	71.70	91.50
23	.....	.....	.....	.....	.....	.....	31.35	.....	53.80	74.10	94.50
24	.....	.....	.....	.....	.....	.....	32.45	.....	55.60	76.50	97.50
25	.....	.....	.....	.....	.....	.....	33.55	.....	57.40	78.90	100.50
26	.....	.....	.....	.....	.....	.....	34.65	.....	59.20	81.30	103.50
27	.....	.....	.....	.....	.....	.....	35.75	.....	61.00	83.70	106.50
28	.....	.....	.....	.....	.....	.....	36.85	.....	62.80	86.10	109.50
29	.....	.....	.....	.....	.....	.....	37.95	.....	64.60	88.50	112.50
30	.....	.....	.....	.....	.....	.....	39.05	.....	66.40	90.90	115.50

$\frac{1}{4}$ -inch, one hundred in package; $\frac{5}{16}$, $\frac{3}{8}$, $\frac{7}{16}$, and $\frac{1}{2}$ -inch up to $\frac{1}{2} \times 11\frac{1}{2}$, fifty; $\frac{5}{8}$ up to 8, and $\frac{3}{4}$ up to 6 inches long, twenty-five in package; longer than 8-inch and 6-inch, respectively, loose; $\frac{1}{8}$ and 1-inch, all sizes loose.
Intermediate lengths take price of next longer length.

CARRIAGE BOLTS

FIG. 1892
EMPIREFIG. 1893
EAGLE

EMPIRE

EAGLE

Empire bolts are made from best quality of drawn wire with good size heads and full squares and accurately cut threads. The nuts are uniformly interchangeable.

When desired we can furnish these bolts with rolled threads in all sizes up to six by three-eighths.

The length of carriage bolts is measured under the head to the point. Larger diameters than those given take machine bolt

LIST PRICE PER HUNDRED

Standard List Nov. 1, 1912

Diameter, Inches

Length Inches	$\frac{1}{8}$ & $\frac{1}{4}$	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{5}{8}$	$\frac{3}{4}$	$\frac{7}{8}$ & 1	$1\frac{1}{4}$
1 & $1\frac{1}{4}$	\$1.00	\$1.40	\$1.90	\$2.20	\$ 3.25	\$ 5.75	\$ 8.50
$1\frac{1}{2}$	1.00	1.40	1.90	2.20	3.25	5.75	8.50
$1\frac{3}{4}$ & 2	1.10	1.52	2.06	2.40	3.25	5.75	8.50
$2\frac{1}{4}$ & $2\frac{1}{2}$	1.20	1.64	2.22	2.60	3.25	5.75	8.50
$2\frac{3}{4}$ & 3	1.30	1.76	2.38	2.80	3.53	6.13	9.00
$3\frac{1}{4}$ & $3\frac{1}{2}$	1.40	1.88	2.54	3.00	3.81	6.51	9.50
$3\frac{3}{4}$ & 4	1.50	2.00	2.70	3.20	4.09	6.89	10.00
$4\frac{1}{4}$ & $4\frac{1}{2}$	1.60	2.12	2.86	3.40	4.37	7.27	10.50
$4\frac{3}{4}$ & 5	1.70	2.24	3.02	3.60	4.65	7.65	11.00
$5\frac{1}{4}$ & $5\frac{1}{2}$	1.80	2.36	3.18	3.80	4.93	8.03	11.50
6	1.90	2.48	3.34	4.00	5.21	8.41	12.00
$6\frac{1}{2}$	2.00	2.60	3.50	4.20	5.49	8.79	12.50
7	2.10	2.72	3.66	4.40	5.77	9.17	13.00
$7\frac{1}{2}$	2.20	2.84	3.82	4.60	6.05	9.55	13.50
8	2.30	2.96	3.98	4.80	6.33	9.93	14.00
$8\frac{1}{2}$	2.40	3.08	4.14	5.00	6.61	10.31	14.50
9	2.50	3.20	4.30	5.20	6.89	10.69	15.00
$9\frac{1}{2}$	2.60	3.32	4.46	5.40	7.17	11.07	15.50
10	2.70	3.44	4.62	5.60	7.45	11.45	16.00
$10\frac{1}{2}$ & 11	2.90	3.68	4.94	6.00	8.01	12.21	17.00
12	3.10	3.92	5.26	6.40	8.57	12.97	18.00
13	3.30	4.16	5.58	6.80	9.13	13.73	19.00
14	3.50	4.40	5.90	7.20	9.69	14.49	20.00
15	3.70	4.64	6.22	7.60	10.25	15.25	21.00
16	3.90	4.88	6.54	8.00	10.81	16.01	22.00
17	4.10	5.12	6.86	8.40	11.37	16.77	23.00
18	4.30	5.36	7.18	8.80	11.93	17.53	24.00
19	4.50	5.60	7.50	9.20	12.49	18.29	25.00
20	4.70	5.84	7.82	9.60	13.05	19.05	26.00

Intermediate lengths, take list of the next longer length. Carriage Bolts, when fitted with Hexagon Nuts—15% extra.

EAGLE

TURNED HEADS, FORGED SQUARE NUTS AND FINISHED POINTS

LIST PRICE PER HUNDRED. LIST ADOPTED MAY 24, 1899.

Diameter, Inch

Diameter, Inch

Length, Ins.	$\frac{1}{8}$ & $\frac{1}{4}$	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{5}{8}$	$\frac{3}{4}$	$\frac{7}{8}$ & 1	$1\frac{1}{4}$	Length, Ins.	$\frac{1}{8}$ & $\frac{1}{4}$	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{5}{8}$	$\frac{3}{4}$	$\frac{7}{8}$ & 1	$1\frac{1}{4}$
1	\$3.00	\$4.00	\$5.40	\$7.30	\$9.50	.....	.....	5	\$4.80	\$6.00	\$7.90	\$10.25	\$13.54	\$22.75	\$28.75
$1\frac{1}{4}$	3.10	4.00	5.40	7.30	9.50	.....	.....	$5\frac{1}{2}$	5.10	6.30	8.40	10.65	14.00	23.75	30.50
$1\frac{1}{2}$	3.20	4.00	5.40	7.30	9.50	.....	.....	6	5.40	6.60	8.80	11.05	14.55	24.75	32.50
$1\frac{3}{4}$	3.30	4.00	5.40	7.50	9.80	.....	.....	$6\frac{1}{2}$	.....	7.00	9.30	11.50	15.10	25.75	33.50
2	3.40	4.10	5.40	7.70	10.10	\$16.75	.....	7	.....	7.30	9.70	11.85	15.70	26.75	36.25
$2\frac{1}{4}$	3.50	4.20	5.60	7.90	10.35	17.25	.....	$7\frac{1}{2}$	.....	7.60	10.10	12.35	16.25	27.75	38.00
$2\frac{3}{4}$	3.60	4.40	5.80	8.15	10.65	17.75	.....	8	.....	7.90	10.50	12.75	16.80	28.75	40.00
$2\frac{1}{2}$	3.70	4.50	6.00	8.35	10.90	18.25	.....	$8\frac{1}{2}$	.....	8.20	10.90	13.15	17.35	29.75	42.00
3	3.80	4.70	6.20	8.55	11.20	18.75	\$21.50	9	.....	8.50	11.40	13.60	17.90	30.75	43.75
$3\frac{1}{4}$	3.90	4.90	6.50	8.75	11.50	19.25	22.35	$9\frac{1}{2}$	.....	.....	11.90	14.00	18.50	31.75	45.75
$3\frac{3}{4}$	4.00	5.00	6.70	8.95	11.75	19.75	23.25	10	.....	.....	12.40	14.45	19.00	32.75	47.50
$3\frac{1}{2}$	4.10	5.20	6.90	9.15	12.00	20.25	24.50	$10\frac{1}{2}$	.....	.....	12.90	14.85	19.60	33.75	49.30
4	4.20	5.30	7.10	9.40	12.30	20.75	25.00	11	.....	.....	13.40	15.25	20.15	34.75	51.25
$4\frac{1}{4}$	4.35	5.50	7.30	9.60	12.60	21.25	26.85	$11\frac{1}{2}$	.....	.....	13.90	15.70	20.70	35.75	53.00
$4\frac{3}{4}$	4.50	5.70	7.50	9.80	12.90	21.75	27.80	12	.....	.....	14.40	16.15	21.30	36.75	55.00
$4\frac{1}{2}$	4.65	5.85	7.70	10.00	13.15	22.25	28.30								

Intermediate lengths take next longer size list.

$\frac{1}{8}$ and $\frac{1}{4}$ inch 100; $\frac{3}{8}$, $\frac{1}{2}$, $\frac{5}{8}$, $\frac{3}{4}$ inch 50; larger and longer packed as wanted.

STOVE BOLTS

ROUND AND FLAT HEAD



FIG. 1894

FULL THREADED TO THE HEAD



FIG. 1895

LIST PRICE PER HUNDRED

REVISED JUNE 1, 1908

Length Inches	Diameter, Inch							Length Inches	Diameter, Inch					
	$\frac{1}{8}$ and $\frac{5}{16}$	$\frac{1}{4}$	$\frac{3}{8}$ and $\frac{1}{2}$	$\frac{5}{16}$	$\frac{3}{8}$	$\frac{7}{16}$	$\frac{1}{2}$		$\frac{1}{8}$	$\frac{1}{4}$ and $\frac{3}{8}$	$\frac{5}{16}$	$\frac{3}{8}$	$\frac{7}{16}$	$\frac{1}{2}$
$\frac{3}{8}$	\$.85	\$.85	.....	.....	.....	.....	.....	$3\frac{1}{4}$	\$1.60	\$2.10	\$2.85	\$4.40	\$8.75	\$11.60
$\frac{1}{2}$	.85	.85	\$1.20	.....	.....	.....	.....	$3\frac{1}{2}$	1.70	2.20	3.00	4.60	8.95	11.75
$\frac{5}{8}$	.85	.85	1.20	.....	.....	.....	.....	$3\frac{3}{4}$	1.80	2.30	3.15	4.80	9.15	12.00
$\frac{3}{4}$	.85	.85	1.20	\$1.75	\$2.65	.....	.....	4	1.90	2.40	3.30	5.00	9.40	12.30
$\frac{7}{8}$	.90	.90	1.25	1.80	2.70	.....	.....	$4\frac{1}{4}$	2.00	2.50	3.45	5.20	9.60	12.60
1	.90	.90	1.30	1.85	2.75	\$7.30	\$ 9.50	$4\frac{1}{2}$	2.10	2.60	3.60	5.40	9.80	12.90
$1\frac{1}{8}$	.95	.95	1.35	1.90	2.85	7.30	9.50	$4\frac{3}{4}$	2.20	2.70	3.75	5.60	10.00	13.15
$1\frac{1}{4}$	1.00	1.00	1.40	1.95	2.90	7.30	9.50	5	2.30	2.85	3.90	5.80	10.25	13.45
$1\frac{3}{8}$	1.05	1.05	1.45	2.00	3.00	7.30	9.50	$5\frac{1}{4}$	2.40	3.00	4.10	6.00	10.45	13.75
$1\frac{1}{2}$	1.10	1.10	1.50	2.05	3.10	7.30	9.50	$5\frac{1}{2}$	2.50	3.15	4.30	6.20	10.65	14.00
$1\frac{3}{4}$	1.15	1.15	1.55	2.15	3.20	7.50	9.80	$5\frac{3}{4}$	2.60	3.30	4.50	6.40	10.85	14.25
2	1.20	1.20	1.60	2.30	3.40	7.70	10.10	6	2.75	3.45	4.70	6.60	11.05	14.55
$2\frac{1}{4}$	.....	1.25	1.70	2.40	3.60	7.90	10.35	$6\frac{1}{4}$	2.90	3.60	4.90	6.80	11.30	14.85
$2\frac{1}{2}$	.....	1.30	1.80	2.50	3.80	8.15	10.65	$6\frac{1}{2}$	3.05	3.75	5.10	7.00	11.50	15.10
$2\frac{3}{4}$	.....	1.40	1.90	2.60	4.00	8.35	10.90							
3	.....	1.50	2.00	2.70	4.20	8.55	11.20							

TIRE BOLTS

EMPIRE



FIG. 1896

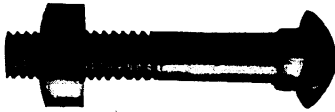
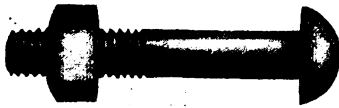
WITH CHAMFERED AND TRIMMED NUTS

LIST PRICE PER HUNDRED

LIST OF DECEMBER 28, 1899

Length Inches	Diameter, Inch					Length Inches	Diameter, Inch			
	$\frac{1}{8}$	$\frac{1}{4}$	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{5}{8}$		$\frac{1}{8}$	$\frac{1}{4}$	$\frac{3}{8}$	$\frac{1}{2}$
1	\$.60	\$.60	\$.95	\$1.40	\$2.20	$3\frac{1}{2}$	\$1.00	\$1.35	\$1.89	\$2.80
$1\frac{1}{4}$	.60	.60	.95	1.40	2.20	$3\frac{3}{4}$	1.05	1.40	1.96	2.90
$1\frac{1}{2}$	.60	.60	.95	1.40	2.20	4	1.10	1.45	2.03	3.00
$1\frac{3}{4}$	.65	.65	1.00	1.40	2.20	$4\frac{1}{4}$	.....	1.50	2.10	3.10
2	.70	.70	1.05	1.47	2.20	$4\frac{1}{2}$	.....	1.55	2.17	3.20
$2\frac{1}{4}$	.....	.75	1.10	1.54	2.30	$4\frac{3}{4}$	.....	1.60	2.24	3.30
$2\frac{1}{2}$	.....	.80	1.15	1.61	2.40	5	.....	1.65	2.31	3.40
$2\frac{3}{4}$	.....	.85	1.20	1.68	2.50	$5\frac{1}{4}$	.....	.....	2.38	3.50
3	.....	.90	1.25	1.75	2.60	$5\frac{1}{2}$	.....	.....	2.45	3.60
$3\frac{1}{4}$	.....	.95	1.30	1.82	2.70	$5\frac{3}{4}$	.....	.....	2.52	3.70
							.....	.....	2.59	3.80

AUTOMOBILE HUB BOLTS

FIG. 1897
SQUARE SHOULDERFIG. 1898
FIN. SHOULDER

Norway Iron, black heads, finished point, and cold punched hexagon nuts.

LIST PRICE PER HUNDRED—EITHER STYLE

Length Inches	Diameter, Inch			
	$\frac{1}{8}$	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{3}{4}$
2	\$4.10	\$5.40	.....	.....
2½	4.20	5.60	\$7.90	.....
2½	4.40	5.80	8.15	\$10.65
2¾	4.50	6.00	8.35	10.90
3	4.70	6.20	8.55	11.20
3½	.....	.....	8.95	11.75
4	.....	.....	.....	12.30

50 in a Box.

STEP OR FENDER BOLTS

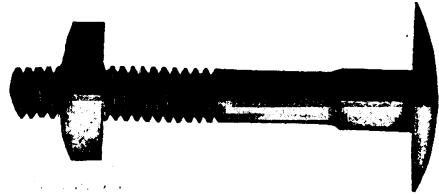


FIG. 1899

Forged steel, short square under head, finished head and point.

LIST PRICE PER HUNDRED

Length Inches	Diameter Inch		
	$\frac{1}{8}$ & $\frac{1}{4}$	$\frac{1}{2}$	$\frac{3}{4}$
1	\$3.00	\$4.00	\$5.40
1½	3.10	4.00	5.40
1½	3.20	4.00	5.40
1¾	3.30	4.00	5.40
2	3.40	4.10	5.40
2½	3.50	4.20	5.60
2½	3.60	4.40	5.80
3	3.80	4.70	6.20

$\frac{1}{8}$, $\frac{1}{4}$ -100; $\frac{1}{2}$, $\frac{3}{4}$ -50 in a package.

AUTO END SPRING BOLTS

LIST PRICE PER HUNDRED

Length Inches	Diameter, Inch		
	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{1}{2}$
3	\$5.80	\$11.20	\$18.75
3½	6.20	11.75	19.75
4	6.60	12.30	20.75

50 in a Box.

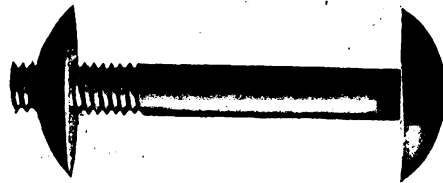


FIG. 1900

Norway iron, turned head, finished point, cold punched oval nut.

HEAVY HALF-OVAL SPRING CLIPS

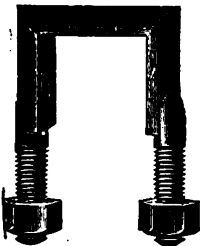


FIG. 1901

FOR SPRINGS 1½-INCH WIDE

Size No.	Flat	Stem	Over all	List Price Each
150A	1	$\frac{3}{8}$	3	\$.30
150C	1	$\frac{1}{2}$	2½	.35
150D	$1\frac{1}{8}$	$\frac{1}{2}$	2½	.35
150E	$1\frac{1}{8}$	$\frac{1}{2}$	3	.35

FOR SPRINGS 1¼-INCH WIDE

Size No.	Flat	Stem	Over all	List Price Each
175B	1	$\frac{1}{2}$	2¾	\$.37
175C	$1\frac{1}{8}$	$\frac{1}{2}$	3	.37
175F	$1\frac{1}{2}$	$\frac{1}{2}$	3¼	.35
175P	$1\frac{1}{2}$	$\frac{1}{2}$	3¾	.39
175H	2	$\frac{1}{2}$	3½	.38
175J	2½	$\frac{1}{2}$	4	.39

FOR SPRINGS 2 INCHES WIDE

200B	$1\frac{1}{8}$	$\frac{1}{2}$	$3\frac{1}{4}$	\$.40
200E	$1\frac{1}{2}$	$\frac{1}{2}$	$3\frac{1}{4}$	.40
200G	$1\frac{3}{4}$	$\frac{1}{2}$	$3\frac{1}{8}$	.41
200H	$1\frac{1}{8}$	$\frac{1}{2}$	$4\frac{1}{4}$	.42
200HH	$2\frac{1}{4}$	$\frac{1}{2}$	$4\frac{1}{2}$	.42
200L	$1\frac{1}{2}$	$\frac{1}{2}$	$3\frac{1}{2}$	.46
200N	$1\frac{1}{8}$	$\frac{1}{2}$	$3\frac{3}{4}$	.46
200BB	$1\frac{1}{8}$	$\frac{1}{2}$	$4\frac{1}{2}$	.48
200P	$2\frac{3}{8}$	$\frac{1}{2}$	$4\frac{1}{4}$	.49
200V	$1\frac{1}{2}$	$\frac{1}{2}$	4	.63
200KK	2	$\frac{1}{2}$	4	.63
200ZZ	$2\frac{1}{2}$	$\frac{1}{2}$	$4\frac{3}{4}$	.70
200AA	2	$\frac{5}{8}$	$4\frac{1}{2}$	.80

FOR SPRINGS 2¼-INCHES WIDE

225C	$1\frac{5}{8}$	$\frac{1}{2}$	4	\$.50
225B	2	$\frac{1}{2}$	4	.50
225D	$1\frac{5}{8}$	$\frac{5}{8}$	4	.65
225P	$2\frac{5}{8}$	$\frac{5}{8}$	$4\frac{1}{2}$	.85

FOR SPRINGS 2½ INCHES WIDE

250D	2	$\frac{1}{2}$	$4\frac{1}{2}$	\$.55
250C	$2\frac{3}{4}$	$\frac{1}{2}$	$6\frac{1}{8}$	.70
250M	$1\frac{3}{4}$	$\frac{5}{8}$	$4\frac{1}{4}$	.72
250E	$2\frac{3}{4}$	$\frac{5}{8}$	$4\frac{3}{4}$	.92

IRON MACHINE SCREWS

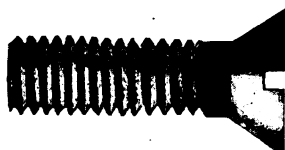
FIG. 1908
FLAT HEADFIG. 1909
ROUND HEADFIG. 1910
FILLISTER HEAD

LIST PRICE PER GROSS

No.	2	3	4	5	6	7	8	9	10	12	14	16	18	20	24	28	30	34
Length Inches																		
1/8	\$.30	\$.30	\$.30	\$.35	\$.35	\$.40	\$.40	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
1/4	.30	.30	.30	.35	.35	.40	.40	.60	.60	.70	.85	.....	.....	.....	.....	.....	.....	.....
3/8	.30	.30	.30	.35	.35	.40	.40	.60	.60	.70	.85	.....	.....	.....	.....	.....	.....	.....
1/2	.32	.32	.32	.37	.37	.44	.44	.65	.65	.75	.90	\$1.15	.....	.....	.....	.....	.....	.....
5/8	.32	.32	.32	.37	.37	.44	.44	.65	.65	.75	.90	1.15	\$1.50	\$1.90	\$2.30	.....	.....	.....
3/4	.34	.34	.34	.39	.39	.48	.48	.70	.70	.80	.95	1.20	1.60	2.00	2.40	.....	.....	.....
7/8	.34	.34	.34	.39	.39	.48	.48	.70	.70	.80	.95	1.20	1.60	2.00	2.40	.....	.....	.....
1	.37	.37	.37	.42	.42	.52	.52	.75	.75	.85	1.00	1.25	1.70	2.10	2.50	.....	.....	.....
1 1/8	.37	.37	.37	.42	.42	.52	.52	.75	.75	.85	1.00	1.25	1.70	2.10	2.50	.....	.....	.....
1 1/4	.41	.41	.41	.46	.46	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
1 1/2	.41	.41	.41	.46	.46	.56	.56	.80	.80	.90	1.05	1.30	1.80	2.20	2.60	\$3.20	\$4.00	\$5.10
1 3/4	.45	.45	.45	.50	.50	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
2	.45	.45	.45	.50	.50	.60	.60	.85	.85	.95	1.15	1.40	1.90	2.30	2.70	3.30	\$4.25	5.85
2 1/8	.....	.....	.50	.55	.55	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
2 1/4	.....	.....	.50	.55	.55	.65	.65	.90	.90	1.00	1.25	1.50	2.00	2.40	2.80	3.75	4.50	6.60
2 1/2	.....	.....	.55	.60	.60	.70	.70	1.00	1.00	1.10	1.35	1.60	2.20	2.60	3.00	4.00	5.00	7.00
2 3/4	.....	.....	.60	.65	.65	.75	.75	1.10	1.10	1.20	1.45	1.75	2.40	2.80	3.20	4.35	5.25	7.35
3	.....	.....	.65	.70	.70	.80	.80	1.20	1.20	1.30	1.55	1.90	2.60	3.00	3.40	4.80	5.75	8.00
3 1/8	.....	.....	.70	.75	.75	.85	.85	1.30	1.30	1.40	1.65	2.10	2.80	3.20	3.60	5.10	6.00	8.00
3 1/4	.....	.....	.80	.85	.85	.95	.95	1.40	1.40	1.50	1.75	2.30	3.00	3.40	3.80	5.70	6.35	.....
3 1/2	.....	.....	.90	.95	.95	1.05	1.05	1.50	1.50	1.60	1.85	2.50	3.20	3.60	4.20	5.70	6.65	8.60
3 3/4	.....	.....	1.00	1.05	1.05	1.15	1.15	1.60	1.60	1.70	2.00	2.70	3.40	3.80	4.40	6.35	7.00	.....
4	.....	.....	1.10	1.15	1.15	1.25	1.25	1.70	1.70	1.80	2.20	2.90	3.60	4.00	4.60	6.35	7.35	9.40
4 1/8	.....	.....	.....	1.25	1.25	1.45	1.45	1.90	1.90	2.20	2.60	3.30	4.00	4.40	4.80	6.90	8.00	10.30
4 1/4	.....	.....	.....	.....	.....	1.65	1.65	2.20	2.20	2.50	2.80	3.50	4.40	4.90	5.30	7.75	8.90	11.50
4 1/2	.....	.....	.....	.....	.....	1.90	1.90	2.50	2.50	2.90	3.20	4.00	4.90	5.40	5.90	8.60	9.85	.....
4 3/4	.....	.....	.....	.....	.....	2.30	2.30	2.90	2.90	3.50	3.80	4.50	5.60	6.00	7.40	9.70	11.00	.....
5	.....	.....	.....	.....	.....	.....	.....	3.30	3.30	4.25	4.50	5.50	6.50	7.00	8.80	11.50	13.00	.....
5 1/8	.....	.....	.....	.....	.....	.....	.....	3.75	3.75	5.00	5.25	6.50	7.50	8.25	10.10	13.20	15.00	.....
5 1/4	.....	.....	.....	.....	.....	.....	.....	.....	.....	6.00	6.00	7.50	8.50	9.25	12.20	14.70	17.50	.....
5 1/2	.....	.....	.....	.....	.....	.....	.....	.....	.....	6.75	6.75	8.50	9.60	10.25	13.50	16.50	20.50	.....
Threads	56	48 56	32, 36, 40	30 32 36	30 32	30 32	24, 30, 32	20, 24	16, 18, 20	16, 18	14, 16	13						
Diam. About	1/8	3/8	1/2	5/8	3/4	7/8	1	1 1/8	1 1/4	1 1/2	1 3/4	2	2 1/8	2 1/4	2 1/2	2 3/4	3	3 1/4

On Machine Screws, made to order, differing in length, size, thread or head from our regulation Standard Flat, Round and Fillister Head Screws, special prices will be quoted on application.

BRASS MACHINE SCREWS

FIG. 1911
FLAT HEADFIG. 1912
ROUND HEADFIG. 1913
FILLISTER HEAD

LIST PRICE—PER GROSS

No.	2	3	4	5	6	7	8	9	10	12	14	16	18	20	24	28	30	34
Length Inches																		
1/8	.32	.32	.36	.46	.46	.70	.70	1.00	1.00	1.25	1.65	2.90	3.70	4.60	5.50			
1/4	.32	.32	.36	.46	.46	.70	.70	1.00	1.00	1.35	1.75							
3/8	.34	.34	.38	.49	.49	.75	.75	1.05	1.05	1.65	2.15	3.20	4.10	5.00	5.75			
1/2	.36	.36	.40	.52	.52	.80	.80	1.10	1.10	1.45	1.85	3.05	3.90	4.80	5.60			
5/8	.38	.38	.42	.55	.55	.85	.85	1.15	1.15	1.55	2.00	3.35	4.30	5.25	6.30			
3/4	.40	.40	.44	.58	.58	.90	.90	1.25	1.25	1.65	2.15	3.50	4.50	5.50	6.50			
7/8	.43	.43	.47	.62	.62	.95	.95	1.35	1.35	1.75	2.30	3.60	4.60	5.60	6.60			
1	.46	.46	.50	.66	.66	1.00	1.00	1.45	1.45	1.85	2.45	3.80	4.90	5.90	6.90			
1 1/8	.49	.49	.53	.70	.70													
1 1/4	.52	.52	.56	.74	.74	1.10	1.10	1.65	1.65	2.05	2.75	3.80	4.90	5.90	6.90			
1 1/2	.55	.55	.59	.78	.78													
1 3/4	.58	.58	.62	.82	.82	1.20	1.20	1.85	1.85	2.25	3.05	4.10	5.30	6.50	7.40	\$11.25		
2			.65	.86	.86													
2 1/8			.70	.90	.90	1.30	1.30	2.05	2.05	2.45	3.35	4.40	5.70	7.00	8.50	13.00	\$15.75	18.00
2 1/4			.80	1.05	1.05	1.45	1.45	2.20	2.20	2.65	3.55	4.65	6.00	7.50	9.00			
2 1/2			.90	1.20	1.20	1.60	1.60	2.35	2.35	2.85	3.75	4.90	6.30	8.00	9.90	15.40	18.75	22.10
2 3/4			1.00	1.35	1.35	1.75	1.75	2.50	2.50	3.05	3.95	5.20	6.60	8.50	11.50			
3			1.10	1.50	1.50	1.90	1.90	2.65	2.65	3.25	4.15	5.50	6.90	9.00	12.00	18.35	22.50	26.60
3 1/8			1.25	1.70	1.70	2.10	2.10	2.85	2.85	3.50	4.40	5.85	7.30	9.50				
3 1/4			1.40	1.90	1.90	2.30	2.30	3.05	3.05	3.75	4.65	6.20	7.70	10.00	12.70	20.40	24.25	28.10
3 1/2			1.55	2.10	2.10	2.50	2.50	3.25	3.25	4.00	4.90	6.60	8.10	10.50				
3 3/4			1.70	2.30	2.30	2.70	2.70	3.45	3.45	4.25	5.15	7.00	8.60	11.00	13.50	21.80	26.00	30.20
4				2.70	2.70	3.10	3.10	3.85	3.85	4.75	5.65	8.00	9.75	12.00	14.90	23.05	28.00	32.90
								4.65	4.65	5.80	6.80	9.00	10.50	13.50	15.50	25.35	30.50	35.60
								6.00	6.00	7.00	8.00	10.00	12.50	15.00	17.00	27.50	33.00	
								7.50	7.50	8.50	9.50	11.00	15.00	16.50	19.00	29.50	36.00	
								9.00	9.00	10.50	11.50	15.00	17.50	18.50	22.50	33.75	39.50	
								11.00	11.00	12.50	15.00	18.00	19.50	22.00	25.50	37.50	42.75	
								13.50	13.50	15.00	18.50	20.00	22.50	25.00	28.00	40.25	46.00	
								16.50	16.50	18.00	22.00	25.00	26.50	28.00	32.00	44.25	49.50	
Thread	56	48 56	32, 36, 40		30 32 36	30 32	30 32 36	24, 30, 32		20, 24		16, 18, 20		16, 18		14, 16		13
Diam. About	5/16	3/16	7/16	1/8	5/16	3/8	5/8	1 1/16	1 1/8	1 1/4	1 1/2	1 3/4	2	2 1/8	2 1/4	2 3/4	3	3 1/2

On Machine Screws, made to order, differing in length, size, thread or head from our regular Standard Flat and Round Head Screws, special prices will be quoted on application. Brass Fillister Head Screws to order only.

CAP SCREWS, SQUARE AND HEXAGON HEAD

IRON—MILLED FROM SOLID BAR



FIG. 1914

SQUARE HEAD

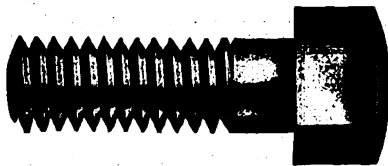


FIG. 1915

CUT THREADS—U. S. FORM



FIG. 1916

HEXAGON HEAD

Regular Cap Screws have heads ground and polished and are threaded three-fourths their length when not longer than three inches; from three to four inches long, two-thirds their length; longer than four inches, one-half their length.

Threads, Diameter and Lengths other than listed are special, and price is based on quantity.

Steel Cap Screws, 25% net advance over iron.

Cap Screws having heads larger than regular, the list price is governed by the diameter of the head; discount according to quantity.

When Cap Screws are case hardened, an extra charge will be added.

When finished after case hardened, an extra charge will be added.

We carry in stock Iron Cap Screws, U. S. S. threads.

Unless otherwise specified, all orders are filled with U. S. S. thread. V thread furnished only when specified.

1/2" diameter U. S. S. thread, furnished with 12 or 13 threads.

LIST PRICE, PER HUNDRED

Diameter of Square Head Inches	3/8	7/16	1/2	5/8	3/4	7/8	1	1 1/8	1 1/4	1 3/8	1 1/2
Diameter of Hexagon Head Inches	7/16	1/2	5/8	3/4	7/8	1	1 1/8	1 1/4	1 3/8	1 1/2	1 3/4
Diameter of Screw Inches	1/4	5/16	3/8	1/2	5/8	3/4	7/8	1	1 1/8	1 1/4	1 1/2
Length under Head to Extreme Point, Inches	3/8	\$3.00	\$3.25	\$3.75	\$ 4.50	\$ 5.70	....	....	....	....	....
7/8	3.15	3.40	3.90	4.70	5.80	....	....	....	....	....	....
1	3.25	3.50	4.00	4.90	5.90	\$ 9.25	\$ 9.25	....	....	....	....
1 1/8	3.50	3.75	4.25	5.30	6.50	9.50	9.50	....	....	....	....
1 1/4	3.75	4.00	4.50	5.70	7.10	10.00	10.00	\$12.50	....	....	....
1 3/8	4.00	4.25	4.85	6.10	7.70	10.75	10.75	14.50	19.70	\$22.75	....
2	4.25	4.85	5.20	6.50	8.30	11.50	11.50	15.50	21.00	25.00	\$34.00
2 1/4	4.70	5.35	5.55	7.15	8.90	12.60	12.60	16.50	22.40	27.25	36.75
2 1/2	5.25	5.80	6.00	7.50	9.50	13.60	13.60	17.50	23.70	29.50	39.50
2 3/4	5.75	6.30	6.65	7.90	10.10	14.40	14.40	19.00	25.00	31.75	42.25
3	6.25	6.80	7.20	8.40	10.70	15.20	15.20	20.60	26.40	34.00	45.00
3 1/4	....	....	....	9.15	11.50	16.00	16.00	22.10	28.20	36.25	47.75
3 1/2	....	....	....	9.75	12.30	17.30	17.30	23.70	30.00	38.50	50.50
3 3/4	....	....	....	10.50	13.10	18.60	18.60	25.30	31.80	40.75	53.25
4	....	....	....	11.10	13.90	19.90	19.90	26.90	33.60	43.00	56.00
4 1/4	....	....	....	....	....	....	....	21.20	28.50	35.40	45.25
4 1/2	....	....	....	....	....	....	....	22.50	30.10	37.20	47.50
4 3/4	....	....	....	....	....	....	....	31.70	39.00	49.75	64.25
5	....	....	....	....	....	....	....	....	40.80	52.00	67.00
Threads to inch	20	18	16	14	12	12	11	10	9	8	7
Add for each 1/4 inch	\$.40	\$.50	\$.60	\$.70	\$.80	\$1.30	\$1.30	\$1.60	\$1.80	\$2.25	\$2.75
											\$3.50

In ordering screws 1/2 inch in diameter, advise whether wanted with 12 or 13 threads.

CAP SCREWS — HEXAGON HEAD, S. A. E. (A. L. A. M.) STANDARD

STEEL

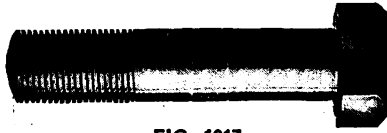


FIG. 1917

LENGTH OF THREAD IS $1\frac{1}{2}$ TIMES BODY DIAMETER

LIST PRICE PER HUNDRED

Length inches	Diameter, inches								
	$\frac{1}{4}$	$\frac{5}{16}$	$\frac{3}{8}$	$\frac{7}{16}$	$\frac{1}{2}$	$\frac{5}{8}$	$\frac{3}{4}$	$\frac{7}{8}$	1
$\frac{1}{2}$	\$3.45	\$4.10	\$4.70	.....	.....	.....	.....	.....	.....
$\frac{5}{8}$	3.45	4.10	4.70	.....	.....	.....	.....	.....	.....
$\frac{3}{4}$	3.45	4.10	4.70	.....	.....	.....	.....	.....	.....
$\frac{7}{8}$	3.65	4.30	4.90	\$ 6.60	.....	.....	.....	.....	.....
1	3.85	4.50	5.10	6.80	\$ 7.40	.....	.....	.....	.....
$1\frac{1}{4}$	4.10	4.80	5.35	7.35	8.15	\$11.90	\$14.70	.....	.....
$1\frac{1}{2}$	4.40	5.10	5.65	8.00	8.90	12.50	14.70	\$16.90	.....
$1\frac{3}{4}$	4.70	5.45	6.05	8.65	9.65	13.45	15.80	18.15	\$24.65
2	5.00	6.05	6.50	9.25	10.40	14.40	16.90	19.40	26.25
$2\frac{1}{4}$	5.90	6.70	6.95	10.05	11.15	15.75	18.20	20.65	28.00
$2\frac{1}{2}$	6.55	7.25	7.50	10.65	11.90	17.00	19.45	21.90	29.65
$2\frac{3}{4}$	7.20	7.90	8.30	11.25	12.60	18.00	20.90	23.80	31.25
3	7.80	8.50	9.00	11.95	13.40	19.00	22.40	25.75	33.00
$3\frac{1}{4}$	.....	.....	.....	12.90	14.40	20.00	23.90	27.65	35.25
$3\frac{1}{2}$	.....	9.75	10.50	13.80	15.40	21.65	25.65	29.65	37.50
$3\frac{3}{4}$	.....	.....	.....	14.75	16.40	23.25	27.45	31.65	39.75
4	.....	11.00	12.00	15.65	17.40	24.90	29.25	33.65	42.00
$4\frac{1}{4}$	.....	.....	.....	.....	18.40	26.50	31.10	35.65	44.25
$4\frac{1}{2}$	.....	.....	.....	.....	19.40	28.15	33.90	37.65	46.50
$4\frac{3}{4}$	.....	.....	.....	.....	.....	.....	36.70	39.65	48.75
5	.....	.....	.....	.....	.....	.....	39.50	41.65	51.00
Threads.....	28	24	24	20	20	18	18	16	16
Head diam., in...	$\frac{7}{16}$	$\frac{1}{2}$	$\frac{5}{16}$	$\frac{5}{16}$	$\frac{3}{4}$	$\frac{7}{8}$	$\frac{1}{2}$	1	$1\frac{1}{4}$
Head length, in...	$\frac{3}{16}$	$\frac{1}{4}$	$\frac{3}{16}$	$\frac{1}{4}$	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{3}{4}$	$\frac{1}{2}$	$\frac{3}{4}$
Thread lgth, in....	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{5}{8}$	$\frac{3}{4}$	$\frac{1}{2}$	$\frac{3}{4}$	$\frac{1}{2}$	$1\frac{1}{4}$	$1\frac{3}{4}$

CAP SCREW BLANKS



FIG. 1918

HEXAGON HEAD

HIGH GRADE STEEL, MILLED BRIGHT, FINISHED HEAD

LIST PRICE PER HUNDRED

Length inches	Diameter, inches					
	$\frac{1}{4}$	$\frac{5}{16}$	$\frac{3}{8}$	$\frac{7}{16}$	$\frac{1}{2}$	$\frac{3}{4}$
$1\frac{1}{4}$	\$4.38	.....	.....	.....	.....	.....
$1\frac{1}{2}$	.....	\$ 5.00	.....	.....	.....	.....
2	5.31	6.06	\$ 6.50	\$ 8.13	\$10.38	\$14.38
$2\frac{1}{2}$	6.56	7.25	7.50	9.38	11.88	.....
3	7.81	8.50	9.00	10.50	13.38	19.00
$3\frac{1}{2}$	.....	9.75	10.50	12.20	15.38	.....
4	.....	11.00	12.00	13.88	17.38	24.88

CAP SCREWS—ROUND AND FILLISTER HEAD



FIG. 1919
ROUND HEAD



FIG. 1920
FILLISTER HEAD

Round and Fillister Head Cap Screws are milled from bars slightly larger than the diameter of the head, which insures perfect alignment of the head with the body.

We carry in stock Fillister Head Cap Screws with U. S. S. threads.

Round Head Cap Screws made to order only.

All orders are filled with U. S. S. thread and $\frac{1}{2}$ " diameter furnished with 13 threads, unless otherwise specified.

LIST PRICE PER HUNDRED

Diameter of Head Inches	$\frac{1}{8}$	$\frac{1}{4}$	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{5}{8}$	$\frac{3}{4}$	$\frac{7}{8}$	1	$1\frac{1}{8}$	$1\frac{1}{4}$
Length of Head Inches	$\frac{1}{8}$	$\frac{1}{4}$	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{5}{8}$	$\frac{3}{4}$	$\frac{7}{8}$	1	$1\frac{1}{8}$	$1\frac{1}{4}$
Diameter of Screw Inches	$\frac{1}{8}$	$\frac{1}{4}$	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{5}{8}$	$\frac{3}{4}$	$\frac{7}{8}$	1	$1\frac{1}{8}$	$1\frac{1}{4}$
$\frac{1}{8}$	\$2.00	\$2.25	\$2.50	\$3.00	\$3.50	\$ 4.00	\$ 5.00	.....	.....	.....
$1\frac{1}{8}$	2.25	2.50	2.75	3.25	3.75	4.25	5.30	\$ 6.60	.....	.....
$1\frac{1}{2}$	2.50	2.75	3.00	3.50	4.00	4.50	5.60	6.90	\$ 9.00	.....
$1\frac{3}{4}$	2.75	3.00	3.25	3.75	4.25	4.75	5.90	7.20	9.50	\$12.00
$2\frac{1}{4}$	3.00	3.25	3.50	4.00	4.50	5.00	6.20	7.50	10.00	12.50
2	3.25	3.50	3.75	4.35	5.00	5.50	6.75	8.00	10.75	13.00
$2\frac{1}{4}$	3.50	3.75	4.00	4.75	5.50	6.00	7.25	8.50	11.50	13.75
$2\frac{1}{2}$	3.75	4.00	4.25	5.15	6.00	6.50	7.75	9.00	12.00	14.50
$2\frac{3}{4}$	4.00	4.25	4.50	5.55	6.50	7.00	8.25	9.50	12.75	15.25
3	4.25	4.50	4.75	5.95	7.00	7.50	8.75	10.00	13.50	16.00
$3\frac{1}{4}$	.....	4.75	5.00	6.35	7.50	8.00	9.25	10.50	14.25	16.75
$3\frac{1}{2}$	.....	.....	5.25	6.75	8.00	8.50	9.75	11.00	15.00	17.50
$3\frac{3}{4}$	.....	.....	.....	7.15	8.50	9.00	10.25	11.50	15.75	18.25
4	.....	.....	.....	.....	9.00	9.50	10.75	12.00	16.50	19.00
$4\frac{1}{4}$	.....	.....	.....	.....	.....	10.00	11.25	12.50	17.25	19.75
$4\frac{1}{2}$	.....	.....	.....	.....	.....	.....	11.75	13.00	18.00	20.50
$4\frac{3}{4}$	.....	.....	.....	.....	.....	.....	12.25	13.50	18.75	21.25
5	.....	.....	.....	.....	.....	.....	12.75	14.00	19.50	22.00
$5\frac{1}{4}$	.....	.....	.....	.....	.....	.....	13.25	14.50	20.25	22.75
$5\frac{1}{2}$	.....	.....	.....	.....	.....	.....	13.75	15.00	21.00	23.50
$5\frac{3}{4}$	.....	.....	.....	.....	.....	.....	14.25	15.50	21.75	24.25
6	.....	.....	.....	.....	.....	.....	14.75	16.00	22.50	25.00
Threads to inch	40	24	20	18	16	14	12	12	11	10
									9	8

CAP SCREWS—BUTTON HEAD

MILLED FROM SOLID BAR

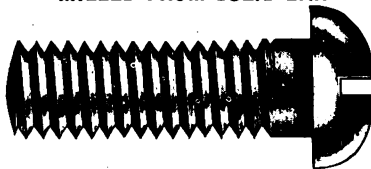


FIG. 1921

LIST PRICE PER HUNDRED

Diameter of Head	* $\frac{3}{8}$ Full	$\frac{1}{8}$	$\frac{1}{4}$	$\frac{5}{16}$	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{3}{4}$	$\frac{1}{2}$	$\frac{5}{8}$	1	$1\frac{1}{4}$
Diameter of Body	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{4}$	$\frac{5}{16}$	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{5}{8}$	$\frac{5}{8}$	$\frac{3}{4}$
Length under Head to Extreme Point.											
$\frac{3}{4}$	\$2.25	\$2.50	\$3.00	\$3.50	\$4.00	\$5.00	.....	.....	.....	.....	.....
1	2.50	2.75	3.25	3.75	4.25	5.30	\$6.60	.....	.....	.....	.....
$1\frac{1}{4}$	2.75	3.00	3.50	4.00	4.50	5.60	6.90	\$ 9.00	.....	.....	.....
$1\frac{1}{2}$	3.00	3.25	3.75	4.25	4.75	5.90	7.20	9.50	\$12.00	.....	.....
$1\frac{3}{4}$	3.25	3.50	4.00	4.50	5.00	6.20	7.50	10.00	12.50	\$ 18.20	.....
2	.....	3.75	4.35	5.00	5.50	6.75	8.00	10.75	13.00	19.20	.....
$2\frac{1}{4}$	.....	.....	4.75	5.50	6.00	7.25	8.50	11.50	13.75	20.20	.....
$2\frac{1}{2}$	.....	.....	.....	6.00	6.50	7.75	9.00	12.00	14.50	21.25	.....
$2\frac{3}{4}$	.....	.....	.....	.....	7.00	8.25	9.50	12.75	15.25	22.40	.....
3	.....	.....	.....	.....	.....	8.75	10.00	13.50	16.00	23.60	.....
Threads to inch	40	24	20	18	16	14	12 or 13	12	11	10	10
Add for each $\frac{1}{4}$ inch	\$.25	.25	.40	.50	.50	.50	.50	.75	.75	1.15	1.15

* No. 4 Wire.

CAP SCREWS—FLAT HEAD

MILLED FROM SOLID BAR

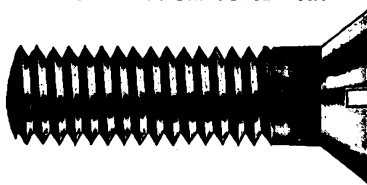


FIG. 1922

LIST PRICE PER HUNDRED

Diameter of Head	$\frac{1}{4}$	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{5}{8}$	$\frac{3}{4}$	$1\frac{1}{8}$	$\frac{7}{8}$	1	$1\frac{1}{8}$	$1\frac{1}{2}$
Diameter of Screw	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{4}$	$\frac{5}{16}$	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{5}{8}$	$\frac{3}{4}$
Length over All										
$\frac{3}{4}$	\$2.25	\$2.50	\$3.10	\$4.00	\$5.00	.....	.....	.....	.....	.....
1	2.50	2.75	3.35	4.25	5.30	\$6.60	.....	.....	.....	.....
$1\frac{1}{4}$	2.75	3.00	3.60	4.50	5.60	6.90	\$9.00	.....	.....	.....
$1\frac{1}{2}$	3.00	3.25	3.85	4.75	5.90	7.20	9.50	\$12.00	.....	.....
$1\frac{3}{4}$	3.25	3.50	4.10	5.00	6.20	7.50	10.00	12.50	\$14.50	.....
2	.....	3.75	4.35	5.50	6.75	8.00	10.75	13.00	15.25	\$19.20
$2\frac{1}{4}$	.....	.....	4.75	6.00	7.25	8.50	11.50	13.75	16.00	20.20
$2\frac{1}{2}$	.....	.....	.....	6.50	7.75	9.00	12.00	14.50	16.75	21.25
$2\frac{3}{4}$	.....	.....	.....	7.00	8.25	9.50	12.75	15.25	17.50	22.40
3	.....	.....	.....	.....	8.75	10.00	13.50	16.00	18.30	23.60
Threads to inch	40	24	20	18	16	14	13	12	11	10
Add for each $\frac{1}{4}$ inch	\$.25	.25	.40	.50	.50	.50	.50	.75	1.00	1.25

SET SCREWS

IRON—REGULAR AND HEADLESS

FIG. 1923
REGULARFIG. 1924
HEADLESS OR GIB

CUT THREADS, U. S. FORM, EXACT SIZE

Regular Set Screws are case hardened, have cup points.

Cup Point Set Screws are furnished, unless otherwise specified.

Headless Set Screws are charged on same list as regular.

Threads, Diameters and Lengths other than listed and Points other than Cup are special, and price is based on quantity.

Steel Set Screws, 25% net advance over iron.

We carry in stock Iron Set Screws, also the principal sizes of Headless Set Screws, Cup Pointed.

Unless otherwise specified, all orders are filled with U. S. S. thread. V thread furnished only when specified.

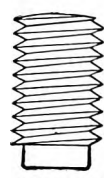
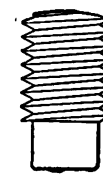
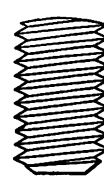
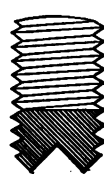
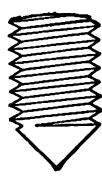
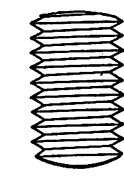
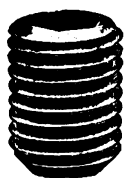
1/2" diameter U. S. S. thread, furnished with 12 or 13 threads.

LIST PRICE PER HUNDRED

REGULAR AND HEADLESS

Length, Inches		Diameter of Screw, Inches.											
		¼	⅕	⅜	⅞	½	⅙	⅚	¾	⅞	1	1⅜	1½
Length under head to Extreme Point	½	\$1.80	\$2.00	\$2.35	.....	.....	.....	.....	.....	.....	.....	.....	.....
	⅝	1.90	2.10	2.45	\$2.80	\$3.30	.....	.....	.....	.....	.....	.....	.....
	¾	2.00	2.20	2.50	2.90	3.40	\$ 5.00	\$ 5.00	.....	.....	.....	.....	.....
	⅞	2.10	2.30	2.60	3.00	3.60	5.50	5.50	.....	.....	.....	.....	.....
	1	2.15	2.35	2.65	3.10	3.80	5.75	5.75	\$10.00	.....	.....	.....	.....
	1¼	2.30	2.50	2.85	3.50	4.30	6.50	6.50	11.00	\$15.50	.....	.....	.....
	1½	2.50	2.70	3.10	4.00	4.80	7.25	7.25	12.00	16.20	\$22.00	.....	.....
	1¾	2.75	3.00	3.50	4.50	5.40	8.00	8.00	12.80	17.70	24.00	\$41.70	.....
	2	3.25	3.50	4.00	5.15	6.00	8.80	8.80	13.60	19.20	26.00	45.00	\$54.00
	2¼	3.75	4.00	4.50	5.75	6.75	9.60	9.60	14.50	20.70	28.00	48.30	58.30
	2½	4.25	4.50	5.00	6.35	7.50	10.40	10.40	15.40	22.20	30.00	51.60	62.60
	2¾	4.75	5.00	5.50	6.75	8.25	11.20	11.20	16.30	23.70	32.00	54.90	66.90
	3	5.25	5.50	6.00	7.20	9.00	12.00	12.00	17.30	25.20	34.00	58.20	71.20
	3¼	.....	.....	.....	7.60	9.75	12.75	12.75	18.40	26.70	36.00	61.50	75.50
	3½	.....	.....	.....	8.00	10.50	13.50	13.50	19.50	28.20	38.00	64.80	79.80
	3¾	.....	.....	.....	8.50	11.25	14.30	14.30	20.75	29.70	40.00	68.10	84.10
Thds. to In. Add for Each ¼ In.	4	.....	.....	.....	9.00	12.00	15.10	15.10	22.00	31.20	42.00	71.40	88.40
	4¼	.....	.....	.....	.....	.....	.....	15.90	23.50	32.70	44.00	74.70	92.70
	4½	.....	.....	.....	.....	.....	.....	16.70	25.00	34.20	46.00	78.00	97.00
	4¾	.....	.....	.....	.....	.....	.....	.....	26.50	35.70	48.00	81.30	101.30
	5	.....	.....	.....	.....	.....	.....	.....	.....	37.20	50.00	84.60	105.60
		20	18	16	14	12	12	11	10	9	8	7	7
		\$.50	.60	.70	.80	.90	1.10	1.10	1.50	1.70	2.25	3.30	4.30

ALLEN SAFETY SET SCREWS



ROUND POINT
FIG. 5032

CONE POINT
FIG. 5033

CUP POINT
FIG. 5034

FLAT POINT
FIG. 5035

DOG POINT
FIG. 5036

HALF DOG POINT
FIG. 5160

Allen Safety Set Screws are different from all other hollow set screws, being made by a patented process which increases the strength over 30 per cent, and adds to the durability and life of the screws.

The deep hexagon holes are clean and perfectly formed down to the bottom, giving greater leverage and leaving plenty of metal for the necessary strength at the point.

The Allen has accurate die cut threads made to standard gauges and is perfect in lead. The hardening is done in the latest and most scientific manner to obtain uniform work.

We furnish every style point and thread listed at no extra cost, but cup point screws in U. S. Standard form of thread only carried in stock. All other style points and threads may be had from factory on short notice.

In ordering, please give length, style point and thread wanted.

PRICE, PER HUNDRED—WRENCHES INCLUDED

Diam. of Screw, Inches		1/4	5/16	3/8	7/16	1/2	9/16	5/8	11/16	3/4	13/16	7/8	15/16	1
Length over all, inches	1/4	\$ 5.00												
	5/16	*5.00	*5.00	\$ 6.25										
	3/8	5.00	*5.00	*5.00	\$ 7.50	\$ 8.75								
	7/16	5.00	5.00	5.00	*6.00	8.75								
	1/2	5.50	5.60	*5.00	*6.00	*7.00	\$10.00	\$12.50	\$15.00	\$15.00				
	5/8	5.50	5.60	6.95	7.00	7.00	*8.00	12.50	15.00	15.00				
	3/4	5.50	5.60	6.95	7.00	*7.00	10.00	*10.00	15.00	15.00				
	7/8	6.00	6.20	7.65	8.30	9.65	11.10	*10.00	12.00	*12.00	\$20.00	\$20.00	\$25.00	\$25.00
	1	6.00	6.20	7.65	8.30	9.65	11.10	12.00	13.00	13.00	15.00	*15.00	25.00	25.00
	1 1/8	6.50	6.80	8.35	9.10	10.55	12.20	14.70	12.00	*12.00	15.00	*15.00	20.00	*20.00
	1 1/4	6.50	7.40	8.35	9.10	10.55	12.20	14.70	16.50	16.50	18.00	18.00	25.00	25.00
	1 1/2	7.00	8.00	9.05	9.90	11.45	13.30	15.80	18.00	18.00	20.00	20.00	22.00	*22.00
	1 3/4	7.50	8.00	9.75	10.70	12.35	14.40	16.90	19.50	19.50	23.55	23.55	31.75	31.75
	2	7.50	8.00	9.75	10.70	12.35	14.40	16.90	19.50	19.50	25.55	25.55	31.75	31.75
	2 1/8	8.00	8.60	10.45	11.50	13.25	15.50	18.00	21.00	21.00	27.25	27.25	34.00	34.00
	2 1/4	8.00	8.60	10.45	11.50	13.25	15.50	18.00	21.00	21.00	27.25	27.25	35.00	35.00
	2 1/2	8.50	9.20	11.15	12.30	14.15	16.60	19.10	22.50	22.50	28.95	28.95	36.25	36.25
	2 3/4	9.00	9.80	11.85	13.10	15.05	17.70	20.20	24.00	24.00	30.60	30.60	38.50	38.50
	3	9.50	10.40	12.55	13.90	15.95	18.80	21.30	25.50	25.50	32.35	32.35	40.75	40.75
	3 1/4	10.00	11.00	13.25	14.70	16.85	19.90	22.40	27.00	27.00	34.05	34.05	43.00	43.00
	3 1/2	10.50	11.60	13.95	15.50	17.75	21.00	23.50	28.50	28.50	35.75	35.75	45.25	45.25
	3 3/4	11.00	12.20	14.65	16.30	18.65	22.10	24.60	30.00	30.00	37.45	37.45	47.50	47.50
	4	11.50	12.80	15.35	17.10	19.55	23.20	25.70	31.50	31.50	39.15	39.15	49.75	49.75
	4 1/4	12.00	13.40	16.05	17.90	20.45	24.30	26.80	32.00	33.00	40.85	40.85	52.00	52.00
	4 1/2	12.50	14.00	16.75	18.70	21.35	25.40	27.90	34.50	34.50	42.55	42.55	54.25	54.25
U.S.S. Threads per Inch		20	18	16	14	13	12	11	11	10	10	9	9	8
Size of Hex. Hole		1/8	5/16	3/8	7/16	1/2	9/16	5/8	11/16	3/4	13/16	7/8	15/16	1
Wrenches Free per 100 Screws		8	8	8	8	8	8	8	8	8	8	8	4	4
Extra Wrenches Each		.03	.04	.05	.06	.07	.07	.08	.10	.10	.12	.12	.15	.15

HOLLOW SET SCREWS

CUP POINTED

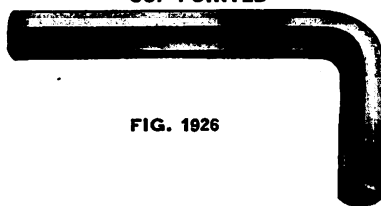


FIG. 1926

FIG. 1925



FIG. 1927



Quality is unsurpassed. Are made from the very best bar screw stock, not pressed steel. Are extremely hard, tough and uniform. Are second to none in strength. U. S. Std. Thread. Any special thread can be furnished to order.

ONE WRENCH PACKED IN EACH BOX

PRICE LIST OF STANDARD SIZES WITH HEX. OR SQUARE HOLE

LIST PRICES OF HEXAGON AND SQUARE WRENCHES

Dia. Inches	Length Inches	No. Thrds per Inch U. S. Std.	No. of Screws per Box	Price per 100	For 1/4 Inch Screws.	Price per 100.....	\$1.50
1 1/4	1 1/4	20	100	\$ 3.30	" 1/4 " " " " " " " " " " " "	1.50	
1 1/8	1 1/8	18	100	3.30	" 1/8 " " " " " " " " " " " "	1.50	
3/8	3/8	16	100	3.30	" 3/8 " " " " " " " " " " " "	2.30	
1/2	1/2	16	100	3.50	" 1/2 " " " " " " " " " " " "	2.65	
5/8	5/8	14	50	3.60	" 5/8 " " " " " " " " " " " "	2.80	
3/4	3/4	13	50	3.90	" 3/4 " " " " " " " " " " " "	3.00	
7/8	7/8	12	50	3.90	" 7/8 " " " " " " " " " " " "	4.50	
1	1	12	25	4.70	" 1 " " " " " " " " " " " "	5.20	
1 1/8	1 1/8	11	50	5.40	" 1 1/8 " " " " " " " " " " " "	6.40	
1 1/4	1 1/4	11	50	6.40	" 1 1/4 " " " " " " " " " " " "		
1 1/2	1 1/2	10	25	8.40			
1 3/4	1 3/4	9	25	12.50			
2	2	8	25	16.75			

Unless otherwise specified, hex. hole screws are furnished.

Unless otherwise specified, hex. hole screws are furnished.

†Made with hexagon hole only.

*Furnished only when specially ordered.

COACH OR LAG SCREWS

GIMLET POINT



SQUARE HEAD

FIG. 1928

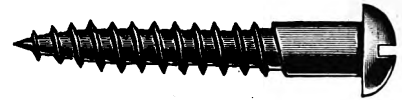
LIST PRICES AND WEIGHT PER HUNDRED

LIST ADOPTED NOVEMBER 12, 1908

Length, Inch.	Diameter, Inch															
	1/4		5/16		3/8		7/16		1/2		5/8		3/4		7/8	
	Per 100	Wt., Lbs.	Per 100	Wt., Lbs.	Per 100	Wt., Lbs.	Per 100	Wt., Lbs.	Per 100	Wt., Lbs.	Per 100	Wt., Lbs.	Per 100	Wt., Lbs.	Per 100	Wt., Lbs.
1 1/4	\$2.25	2	\$2.25	3 1/2	....	....	....	....	....	....	....	....	....	....	....	....
1 1/2	2.25	2 1/4	2.25	4	\$2.70	6	\$3.15	8	\$ 3.75	11 1/8	....	....	....	....	....	....
1 3/4	....	....	....	....	2.80	6 5/8	....	....	....	....	....	....	....	....	....	....
2	2.45	2 3/8	2.45	5	2.96	7	3.47	10	4.11	13 3/8	\$ 6.00	25	....	....	....	....
2 1/2	2.65	3 5/8	2.65	5 1/2	3.22	8	3.79	12	4.47	16 1/2	6.50	28 1/2	\$ 9.20	41	....	....
3	2.85	4	2.85	6 1/2	3.48	9	4.11	13 1/2	4.83	19	7.00	32	9.90	46 1/2	\$15.00	65
3 1/2	3.05	4 3/8	3.05	7 1/4	3.74	10 1/2	4.43	15	5.19	21 1/2	7.50	36	10.60	52	16.00	72 1/2
4	....	....	3.25	8 1/2	4.00	12	4.75	17	5.55	23 3/8	8.00	40	11.30	57 1/2	17.00	80
4 1/2	....	....	3.45	9 1/4	4.26	13 3/8	5.07	19	5.91	26	8.50	43	12.00	63	18.00	88
5	....	....	3.65	10 3/8	4.52	14 1/2	5.39	20 1/2	6.27	28 3/4	9.00	46	12.70	71 1/2	19.00	95 1/2
5 1/2	....	....	3.85	11	4.78	15	5.71	22	6.63	30	9.50	50	13.40	79	20.00	103 1/2
6	....	....	4.05	11 1/2	5.04	17	6.03	24	6.99	32 1/2	10.00	54 1/2	14.10	86 3/4	21.00	111
6 1/2	....	....	4.25	12	5.30	18 1/4	6.35	26	7.35	34 1/2	10.50	58	14.80	89 3/4	22.00	118
7	....	....	4.45	13 1/2	5.56	19 3/4	6.67	27 1/2	7.71	36 3/8	11.00	62	15.50	92 3/4	23.00	126 1/2
7 1/2	....	....	....	....	5.82	....	6.99	29	8.07	40	11.50	65	16.20	100	24.00	134
8	....	....	....	....	6.08	22 3/8	7.31	31	8.43	43 1/2	12.00	68	16.90	106 1/4	25.00	142
9	....	....	....	....	6.60	....	7.95	34 1/2	9.15	47 1/4	13.00	77	18.30	113 3/4	27.00	157
10	....	....	....	....	7.12	....	8.59	38	9.87	54	14.00	87	19.70	125	29.00	172 1/2
11	....	....	....	....	....	....	9.23	41 1/2	10.59	58	15.00	100	21.10	135	31.00	188
12	....	....	....	....	....	....	9.87	45	11.31	62	16.00	110	22.50	151 1/4	33.00	205

1/4 inch, one hundred; 5/16, 3/8 and 1/2 inch, fifty; 5/8 up to 10-inch, twenty-five in package. Longer and larger, loose. Length measured under head.

IRON WOOD SCREWS

FIG. 1929
FLAT HEADFIG. 1930
ROUND HEAD

The following varieties of iron screws are invoiced from this list at varying discounts: Flat, round, fillister and oval head screws; dowel, winged, headless, pinched, bung head and felloe screws, bright, blued, nickel-plated, silver-plated, brassed, bronzed, coppered, japanned, lacquered, tinned and galvanized, also drive screws.

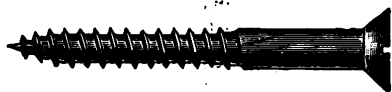
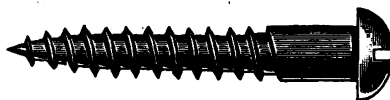
LIST PRICE PER GROSS

ADOPTED JULY 22, 1903

No.	Length of Screw, Inches									
	¼	⅜	½	⅝	¾	⅞	1	1¼	1½	1¾
0	\$.72	\$.72	.....	.....	.....	.....	.....	.....	.....	.....
1	.72	.72	\$.72	\$.72	.....	.....	.....	.....	.....	.....
2	.72	.72	.72	.72	\$.72	\$.74	.....	.....	.....	.....
3	.72	.72	.72	.72	.75	.78	\$.80	\$.88	\$.98	.....
4	.72	.72	.75	.75	.78	.82	.84	.92	1.05	.....
5	.....	.75	.78	.78	.82	.85	.87	.98	1.10	\$1.30
6	.....	.78	.80	.82	.85	.90	.92	1.05	1.15	1.35
7	.....	.82	.84	.86	.90	.94	.98	1.10	1.20	1.45
8	.....	.88	.90	.92	.95	1.00	1.05	1.15	1.30	1.50
9	.....	.94	.96	.98	1.00	1.05	1.10	1.20	1.35	1.55
10	.....	.....	1.05	1.07	1.10	1.15	1.20	1.30	1.40	1.60
11	.....	.....	1.10	1.12	1.15	1.25	1.30	1.40	1.50	1.70
12	.....	.....	1.20	1.20	1.25	1.35	1.40	1.55	1.65	1.80
13	.....	.....	.....	1.25	1.35	1.45	1.60	1.70	1.80	2.00
14	.....	.....	.....	1.30	1.50	1.55	1.70	1.90	2.00	2.25
15	.....	.....	.....	.....	1.65	1.75	2.00	2.15	2.35	2.60
16	.....	.....	.....	.....	1.80	2.00	2.50	2.50	2.80	2.90
17	.....	.....	.....	.....	.....	.....	2.70	2.75	3.20	3.50
18	.....	.....	.....	.....	.....	.....	2.80	3.30	3.80	4.00
20	.....	.....	.....	.....	.....	.....	3.50	4.00	4.30	4.50
22	.....	.....	.....	.....	.....	.....	.....	4.80	5.10	5.20
24	.....	.....	.....	.....	.....	.....	.....	5.40	5.90	6.00

No.	Length of Screw, Inches									
	2	2¼	2½	2¾	3	3½	4	4½	5	6
5	\$1.45	\$1.55	\$1.90	.....	.....	.....	.....	.....	.....	.....
6	1.50	1.60	2.00	\$2.40	\$2.95	.....	.....	.....	.....	.....
7	1.55	1.65	2.10	2.60	3.00	.....	.....	.....	.....	.....
8	1.60	1.75	2.20	2.70	3.05	\$3.90	\$4.90	.....	.....	.....
9	1.65	1.85	2.30	2.80	3.10	4.00	5.10	.....	.....	.....
10	1.75	1.95	2.40	2.90	3.15	4.10	5.20	.....	.....	.....
11	1.85	2.05	2.50	3.00	3.20	4.20	5.30	.....	.....	.....
12	2.00	2.20	2.60	3.10	3.30	4.30	5.40	\$7.00	\$8.10	\$10.00
13	2.20	2.35	2.70	3.20	3.40	4.40	5.60	7.20	8.30	10.30
14	2.45	2.65	2.90	3.30	3.50	4.50	5.90	7.60	8.60	11.00
15	2.75	3.10	3.30	3.60	3.80	4.75	6.20	7.85	9.10	11.60
16	3.10	3.50	3.65	3.90	4.20	4.95	6.50	8.15	9.70	12.40
17	3.70	3.85	4.20	4.50	4.80	5.40	7.00	8.60	10.10	13.00
18	4.20	4.55	4.70	5.00	5.50	6.15	7.60	9.15	10.10	14.50
20	4.80	5.30	5.80	6.10	6.50	7.30	8.60	9.85	11.50	16.00
22	5.50	6.10	6.70	7.20	7.50	8.70	9.70	11.20	13.00	18.00
24	6.40	6.90	7.50	8.50	8.70	10.20	11.20	13.50	15.00	20.00
26	.....	.....	.....	.....	10.50	12.00	14.00	16.00	18.00	23.00
28	.....	.....	.....	.....	.....	.....	16.00	18.50	21.00	27.00
30	.....	.....	.....	.....	.....	.....	18.50	21.50	24.00	30.50

BRASS WOOD SCREWS

FIG. 1931
FLAT HEADFIG. 1932
ROUND HEAD

The following varieties of screws are invoiced from this list, at varying discounts: Flat, round, fillister and oval head screws, of brass, bronze metal, nickel and silver-plated on brass.

LIST PRICE, PER GROSS

ADOPTED JULY 22, 1903

No.	Length of Screw, Inches									
	$\frac{1}{4}$	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{5}{8}$	$\frac{3}{4}$	$\frac{7}{8}$	1	$1\frac{1}{4}$	$1\frac{1}{2}$	$1\frac{3}{4}$
0	\$.84	\$.84	.....	.....	.....	.....	.....	.....	.....	.....
1	.84	.87	\$.92	\$.96	.....	.....	.....	.....	.....	.....
2	.88	.92	.96	1.00	\$1.12	\$1.40	.....	.....	.....	.....
3	.92	.97	1.02	1.08	1.18	1.50	\$1.65	\$2.10	.....	.....
4	.97	1.04	1.08	1.15	1.25	1.55	1.70	2.20	\$2.95	.....
5	1.04	1.12	1.20	1.30	1.40	1.60	1.75	2.25	3.05	.....
6	.....	1.20	1.30	1.40	1.55	1.65	1.80	2.35	3.10	\$3.95
7	.....	1.35	1.45	1.60	1.75	1.90	2.10	2.45	3.20	4.00
8	.....	1.50	1.65	1.85	2.00	2.20	2.45	2.85	3.30	4.10
9	.....	.....	1.90	2.10	2.30	2.50	2.80	3.20	3.65	4.20
10	.....	.....	2.15	2.40	2.65	2.90	3.15	3.50	4.25	4.70
11	.....	.....	.....	2.65	3.00	3.35	3.65	4.10	4.65	5.35
12	.....	.....	.....	3.00	3.35	3.70	4.10	4.65	5.35	6.05
13	.....	.....	.....	3.35	3.70	4.10	4.55	5.35	5.95	6.70
14	.....	.....	.....	3.70	4.10	4.55	5.05	5.85	6.65	7.35
15	.....	.....	.....	4.10	4.55	5.05	5.60	6.55	7.60	8.65
16	.....	.....	.....	4.55	5.05	5.60	6.65	7.20	8.35	9.50
17	.....	.....	.....	.....	.....	.....	.....	7.85	9.15	10.45
18	.....	.....	.....	.....	.....	.....	7.40	9.35	10.85	12.40
20	.....	.....	.....	.....	.....	.....	.....	10.45	12.65	14.50
22	.....	.....	.....	.....	.....	.....	.....	.....	14.50	16.85
24	.....	.....	.....	.....	.....	.....	.....	.....	.....	18.90

No.	Length of Screw, Inches									
	2	$2\frac{1}{4}$	$2\frac{1}{2}$	$2\frac{3}{4}$	3	$3\frac{1}{2}$	4	$4\frac{1}{2}$	5	6
6	\$5.15	.....	.....	.....	.....	.....	.....	.....	.....	.....
7	5.20	.....	.....	.....	.....	.....	.....	.....	.....	.....
8	5.25	\$6.85	.....	.....	.....	.....	.....	.....	.....	.....
9	5.30	6.95	\$9.40	\$11.50	.....	.....	.....	.....	.....	.....
10	5.40	7.05	9.50	11.65	\$13.70	\$15.85	.....	.....	.....	.....
11	6.15	7.25	9.60	11.80	13.85	16.00	.....	.....	.....	.....
12	6.85	7.90	9.70	11.95	14.00	16.15	\$18.60	.....	.....	.....
13	7.55	8.80	9.85	12.10	14.10	16.30	18.80	.....	.....	.....
14	8.45	9.80	10.75	12.25	14.30	16.45	19.00	\$22.60	.....	.....
15	9.75	10.75	11.85	13.00	14.60	16.60	19.25	22.80	.....	.....
16	10.70	11.90	13.00	14.20	15.40	17.70	20.35	23.40	\$26.90	\$31.00
17	11.70	13.00	14.30	15.65	16.80	19.40	22.30	25.75	29.60	34.05
18	13.90	15.40	16.95	18.40	19.95	22.75	26.90	30.90	35.50	40.80
20	16.30	18.00	19.85	21.60	23.40	26.90	30.80	35.40	40.70	46.80
22	18.90	20.95	23.00	25.00	27.10	31.20	36.00	41.40	47.60	54.75
24	21.00	23.30	25.50	28.00	31.15	35.80	40.70	46.80	53.80	61.90
26	.....	.....	.....	.....	35.85	41.20	47.35	54.40	62.60	72.95
28	.....	.....	.....	.....	41.15	47.45	54.55	62.70	72.15	82.95
30	.....	.....	.....	.....	47.45	54.55	62.70	72.15	82.95	93.35



THUMB NUTS

DROP-FORGED FROM STEEL—BLANK OR TAPPED



STYLE A—FIG. 1905

STYLE B—FIG. 1906

When threading or tapping is ordered, a commercial product is furnished, but when additional accuracy is required, an extra charge consistent with the special requirements will be made; this applies both to thumb nuts and thumb screws.

LIST PRICE PER 100

Size of Bolt,.....inches	$\frac{1}{8}$	$\frac{3}{16}$	$\frac{1}{4}$	$\frac{5}{16}$	$\frac{3}{8}$	$\frac{7}{16}$	$\frac{1}{2}$	$\frac{9}{16}$	$\frac{5}{8}$	$\frac{3}{4}$
Diam., Top....."	$\frac{1}{4}$	$\frac{5}{16}$	$\frac{3}{8}$	$\frac{7}{16}$	$\frac{1}{2}$	$\frac{5}{8}$	$\frac{3}{4}$	$\frac{5}{8}$	$\frac{11}{16}$	$\frac{3}{4}$
U. S. S. Threads.....	32	24	20	18	16	14	13	12	11	10
Price, Blank.....per 100	\$1.75	\$2.00	\$2.25	\$2.60	\$3.25	\$4.00	\$5.00	\$6.00	\$7.25	\$10.50
" Tapped....."	4.50	5.00	5.50	6.50	8.00	10.00	12.50	15.00	17.00	23.00

Unless otherwise ordered Blanks will be sent. U. S. standard threads furnished; other threads supplied to order.

When ordering, specify pattern by letter. Specify whether tapped or blank are wanted. Blank nuts are solid, not drilled.

THUMB SCREWS

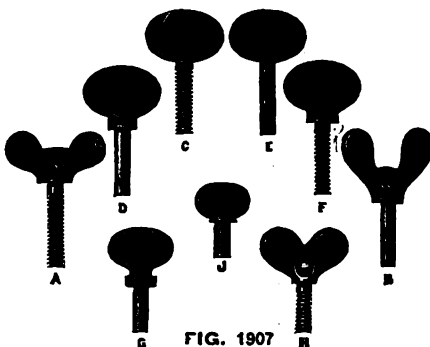


FIG. 1907

LIST PRICE OF BLANKS PER HUNDRED, OF ANY TYPE

Length under Head Inches	Diameter and U. S. S. Threads, per Inch									
	$\frac{1}{8}$ 32	$\frac{3}{16}$ 24	$\frac{1}{4}$ 20	$\frac{5}{16}$ 18	$\frac{3}{8}$ 16	$\frac{7}{16}$ 14	$\frac{1}{2}$ 13	$\frac{9}{16}$ 12	$\frac{5}{8}$ 11	$\frac{3}{4}$ 10
$\frac{1}{4}$	\$3.40	\$3.70	\$4.00	\$4.50	\$5.10	.....	.....	.....	.....	.....
$\frac{1}{2}$	3.55	3.85	4.15	4.65	5.25	\$6.00	\$7.00	\$9.00	.....	.....
$\frac{3}{4}$	3.70	4.00	4.30	4.80	5.40	6.20	7.20	9.25	.....	.....
1	3.85	4.15	4.45	4.95	5.55	6.40	7.40	9.55	\$12.25	\$20.00
$1\frac{1}{4}$	4.00	4.30	4.60	5.10	5.70	6.60	7.65	9.90	12.75	20.50
$1\frac{1}{2}$	4.15	4.45	4.75	5.30	5.90	6.85	7.90	10.30	13.30	21.05
$1\frac{3}{4}$	.....	4.60	4.90	5.50	6.10	7.10	8.20	10.75	13.90	21.70
2	.....	4.80	5.10	5.70	6.30	7.35	8.50	11.25	14.55	22.45
$2\frac{1}{4}$	.....	.....	5.30	5.90	6.50	7.65	8.85	11.80	15.25	23.20
$2\frac{1}{2}$	.....	.....	5.50	6.10	6.70	7.95	9.20	12.40	16.00	24.20
$2\frac{3}{4}$	.....	.....	5.70	6.30	6.95	8.25	9.60	13.05	16.80	25.20
3	.....	.....	5.90	6.50	7.20	8.60	10.10	13.75	17.65	26.35
$3\frac{1}{2}$	.....	.....	.....	6.90	7.70	9.30	11.30	15.15	19.45	28.75
4	.....	.....	.....	7.30	8.30	10.20	12.80	17.00	22.00	31.80

LIST PRICE OF THREADED PER HUNDRED, OF ANY TYPE

$\frac{1}{4}$	5.40	5.70	6.25	7.00	8.10	.....	11.30	14.75	.....	.....
$\frac{1}{2}$	5.65	5.95	6.50	7.25	8.35	9.60	11.30	14.75	.....	.....
$\frac{3}{4}$	5.90	6.20	6.75	7.50	8.60	9.95	11.65	15.15	.....	.....
1	6.20	6.50	7.05	7.80	8.90	10.35	12.05	15.65	20.05	31.00
$1\frac{1}{4}$	6.50	6.80	7.35	8.10	9.20	10.80	12.55	16.30	20.85	31.80
$1\frac{1}{2}$	6.85	7.15	7.70	8.50	9.60	11.35	13.10	17.00	21.70	32.70
$1\frac{3}{4}$	.....	7.50	8.05	8.95	10.05	11.90	13.75	17.75	22.60	33.75
2	.....	7.95	8.50	9.40	10.50	12.45	14.40	18.65	23.65	34.95
$2\frac{1}{4}$	.....	.....	8.95	9.85	11.00	13.05	15.10	19.60	24.80	36.20
$2\frac{1}{2}$	.....	.....	9.40	10.30	11.50	13.65	15.80	20.60	26.00	37.80
$2\frac{3}{4}$	.....	.....	9.85	10.80	12.05	14.25	16.55	21.65	27.25	39.50
3	.....	.....	10.30	11.30	12.60	14.90	17.40	22.75	28.60	41.35
$3\frac{1}{2}$	.....	.....	.....	12.30	13.70	16.30	19.45	25.05	31.55	45.35
4	.....	.....	.....	13.35	15.00	18.00	22.05	28.00	35.50	50.20

Lengths, longer than those listed, can be furnished specially from available dies; intermediate lengths take price of next longer lengths.

Style C can be furnished in $\frac{1}{8}$ and $\frac{1}{4}$ -inch diameters, up to 1 inch long. Threaded screws, except C and E, over 4 inches long, have threads running up only 4 inches.

When ordering indicate pattern by letter. Unless otherwise specified Blanks will be sent.

U. S. Standard Threads furnished, other threads supplied to order.

MACHINE SCREW NUTS

SQUARE AND HEXAGON—PLAIN OR CHAMFERED TAPPED

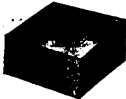


FIG. 1933



FIG. 1934

LIST PRICE PER HUNDRED

COLD PUNCHED SQUARE IRON TAPPED

No.	Threads	Per Gross	No.	Threads	Per Gross
4	32-36-40	\$0.23	18	16-18	\$0.62
6	30-32	.23	20	16-18	.82
8	30-32	.26	22	16-18	.93
10	24-30-32	.29	24	14-16	1.06
12	20-24	.32	26	14-16	1.20
14	20-24	.36	28	14-16	1.35
16	16-18-20	.48	30	14-16	1.50

COLD PUNCHED SQUARE BRASS TAPPED

No.	Threads	Per Gross	No.	Threads	Per Gross
4	32-36-40	\$0.72	18	16-18	\$1.88
6	30-32	.72	20	16-18	2.45
8	30-32	.80	22	16-18	2.70
10	24-30-32	.87	24	14-16	3.17
12	20-24	.94	26	14-16	3.60
14	20-24	1.08	28	14-16	4.10
16	16-18-20	1.44	30	14-16	4.55

CHAMFERED AND TRIMMED HEXAGON IRON TAPPED

No.	Threads	Per Gross	No.	Threads	Per Gross
4	32-36-40	\$0.36	18	16-18	\$0.94
6	30-32	.36	20	16-18	1.22
8	30-32	.40	22	16-18	1.44
10	24-30-32	.43	24	14-16	1.58
12	20-24	.48	26	14-16	1.80
14	20-24	.55	28	14-16	2.02
16	16-18-20	.72	30	14-16	2.30

CHAMFERED AND TRIMMED HEXAGON BRASS TAPPED

No.	Threads	Per Gross	No.	Threads	Per Gross
4	32-36-40	\$1.08	18	16-18	\$2.81
6	30-32	1.08	20	16-18	3.67
8	30-32	1.22	22	16-18	4.32
10	24-30-32	1.30	24	14-16	4.75
12	20-24	1.44	26	14-16	5.40
14	20-24	1.66	28	14-16	6.05
16	16-18-20	2.16	30	14-16	6.91

HOT PRESSED SQUARE AND HEXAGON NUTS

U. S. STANDARD

United States Standard Tapped Nuts are threaded with U. S. form of Threads Tapped Exact.

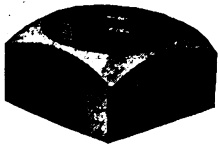


FIG. 1945—SQUARE

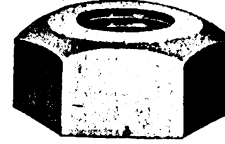


FIG. 1946—HEXAGON

STANDARD LIST

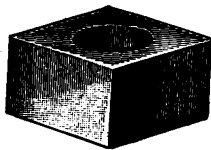
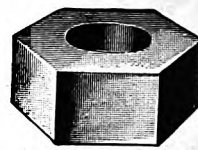
LIST PRICE PER HUNDRED POUNDS

ADOPTED JAN. 1, 1906

Width Inches	Thick- ness Inches	Hole Inches	Size of Bolt Inches	Square		Hexagon		Square		Hexagon	
				Price per 100 Pound		Price per 100 Pound		Average Number in One Keg of 200 Pound		Average Number in One Keg of 200 Pound	
				Blank	Tapped	Blank	Tapped	Blank	Tapped	Blank	Tapped
1/2	1/4	1/8	1/4	\$13.00	\$15.00	\$20.00	\$22.50	13,800	14,760	17,400	18,600
1/2	1/4	1/8	1/4	12.00	13.50	18.00	20.00	7,400	7,915	9,200	9,760
1/2	1/4	1/8	1/4	10.50	11.60	14.00	15.60	5,000	5,320	6,000	6,400
1/2	1/4	1/8	1/4	10.00	10.90	13.00	14.30	3,200	3,400	4,000	4,250
1/2	1/4	1/8	1/4	9.00	9.70	11.20	12.20	2,400	2,540	3,000	3,200
1/2	1/4	1/8	1/4	9.00	9.60	11.20	12.10	1,600	1,690	2,128	2,275
1/2	1/4	1/8	1/4	8.70	9.20	10.50	11.20	1,360	1,440	1,540	1,630
1/2	1/4	1/8	1/4	8.50	8.90	10.00	10.60	832	880	998	1,050
1/2	1/4	1/8	1/4	8.40	8.80	9.90	10.50	544	578	628	665
1/2	1/4	1/8	1/4	8.40	8.80	9.90	10.50	376	397	436	460
1/2	1/4	1/8	1/4	8.40	8.80	9.90	10.50	268	284	288	305
1/2	1/4	1/8	1/4	8.40	8.80	9.90	10.50	206	220	250	260
1/2	1/4	1/8	1/4	8.50	9.00	10.00	10.70	146	157	182	190
1/2	1/4	1/8	1/4	8.80	9.40	10.30	11.10	120	127	144	150
1/2	1/4	1/8	1/4	9.00	9.70	10.50	11.40	95	100	116	120
1/2	1/4	1/8	1/4	9.30	10.00	10.80	11.70	74	77	95	100
1/2	1/4	1/8	1/4	9.50	10.30	11.00	12.00	64	67	80	84
1/2	1/4	1/8	1/4	9.70	10.60	11.20	12.30	53	56	62	65
1/2	1/4	1/8	1/4	10.00	11.00	11.70	12.90	43	45	52	54
1/2	1/4	1/8	1/4	10.00	11.10	11.70	13.00	36	37	44	46
1/2	1/4	1/8	1/4	10.30	11.50	12.20	13.60	28	29	35	36
1/2	1/4	1/8	1/4	10.50	11.80	12.40	13.90	24	25	32	33
1/2	1/4	1/8	1/4	11.00	12.40	13.00	14.60	21	22	27	27
1/2	1/4	1/8	1/4	11.50	13.00	13.50	15.20	16	17	18	18

When ordering, please state whether nuts are to be blank or tapped.

COLD PUNCHED SQUARE AND HEXAGON PLAIN NUTS

FIG. 1943
SQUAREFIG. 1944
HEXAGON

U. S. STANDARD LIST

LIST PRICE PER HUNDRED POUNDS

ADOPTED JAN. 1, 1906

Width, Inches	Thickness, Inches	Hole, Inches	Size of Bolt, Inches	Square		Hexagon		Square		Hexagon	
				Price Per 100 Pounds		Price Per 100 Pounds		Average Number in One Keg of 200 Lbs.		Average Number in One Keg of 200 Lbs.	
				Blank	Tapped	Blank	Tapped	Blank	Tapped	Blank	Tapped
1/2	1/4	1/8	1/4	\$13.80	\$15.80	\$21.00	\$23.50	12,800	13,900	16,400	17,550
1/2	1/4	1/8	1/4	12.80	14.30	19.00	21.00	7500	8000	9200	9840
1/2	1/4	1/8	1/4	11.00	12.10	14.70	16.30	4800	5100	5300	5650
1/2	1/4	1/8	1/4	10.50	11.40	13.70	15.00	3104	3290	3700	3920
1/2	1/4	1/8	1/4	9.30	10.00	11.50	12.50	2200	2330	2700	2860
1/2	1/4	1/8	1/4	9.30	9.90	11.50	12.40	1600	1690	1940	2050
1/2	1/4	1/8	1/4	8.90	9.40	10.70	11.40	1200	1270	1500	1590
1/2	1/4	1/8	1/4	8.60	9.00	10.20	10.80	760	800	920	970
1/2	1/4	1/8	1/4	8.60	9.00	10.20	10.80	496	520	600	630
1/2	1/4	1/8	1/4	8.60	9.00	10.20	10.80	336	350	416	440
1/2	1/4	1/8	1/4	8.60	9.00	10.20	10.80	244	260	304	320
1/2	1/4	1/8	1/4	8.80	9.20	10.50	11.10	187	196	224	235
1/2	1/4	1/8	1/4	8.80	9.30	10.50	11.20	149	156	168	180
1/2	1/4	1/8	1/4	9.60	10.20	11.30	12.10	117	122	133	140
1/2	1/4	1/8	1/4	9.60	10.30	11.30	12.20	86	90	110	120
1/2	1/4	1/8	1/4	10.20	10.90	12.10	13.00	74	77	83	88
1/2	1/4	1/8	1/4	10.20	11.00	12.10	13.10	55	57	72	77
1/2	1/4	1/8	1/4	10.60	11.50	12.60	13.70	48	50	58	60
1/2	1/4	1/8	1/4	11.00	12.00	13.00	14.20	41	43	50	52
1/2	1/4	1/8	1/4	11.50	12.60	13.50	14.80	36	37	42	43

In ordering, be sure to specify size of bolt.

COLD PUNCHED HEXAGON CHECK OR JAM NUTS

CHAMFERED AND TRIMMED

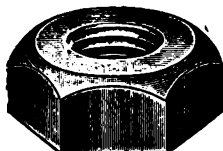
List adopted March 20, 1907.

We consider these are one and the same.

LIST PRICE PER HUNDRED POUNDS



BLANK—FIG. 1935



TAPPED—FIG. 1935 1/2

Wide	Thick	Hole	Bolt	Blank		Tapped	
				Price Per 100 Lb.	No. in 100 Lbs.	Price Per 100 Lb.	No. in 100 Lbs.
1/2	3/16	1/8	1/4	\$33.00	10,760	\$37.50	11,320
1/2	7/32	1/4	1/4	28.00	6,630	32.50	6,970
1/2	1/4	1/4	3/8	24.00	4,420	27.00	4,670
1/2	5/16	1/2	1/2	20.00	2,730	22.50	2,880
1/2	3/8	3/8	3/8	17.00	2,210	18.50	2,340
1/2	1/2	1/2	1/2	17.00	1,600	18.50	1,700
1/2	3/4	3/4	3/4	15.00	1,220	16.30	1,330
1/2	1/2	1/2	1/2	13.50	790	14.60	847
1/2	1/2	1/2	1/2	13.00	527	14.10	563
1/2	1/2	1/2	1/2	13.00	371	14.10	398
1/2	1/2	1/2	1/2	13.00	272	14.10	293
1/2	1/2	1/2	1/2	13.00	190	14.10	205
1/2	1/2	1/2	1/2	14.00	146	15.30	158
1/2	1/2	1/2	1/2	14.50	120	16.00	130
1/2	1/2	1/2	1/2	15.00	94	16.70	102
1/2	1/2	1/2	1/2	16.00	75.5	17.70	82.3
1/2	1/2	1/2	1/2	16.00	63.4	18.00	69.3
1/2	1/2	1/2	1/2	16.00	53.7	18.10	58.7

COLD PUNCHED HEXAGON AND CHECK OR JAM NUTS

SEMI-FINISHED

U. S. STANDARD, TAPPED AND FACED TRUE ON BOTTOM

Revised List, adopted May 5, 1911

FIG. 1937

LIST PRICES

FIG. 1938

Bolt	Width	Thickness		Number of Threads	Price Each	Price per 100	With Double Chamfer Price Each	Price per 100
		U. S. S.	Check Jam					
1/4	1 1/2	1/4	3/8	20	\$0.02	\$2.00	\$0.025	\$2.50
1/4	1 1/2	1/4	3/8	18	.025	2.50	.0275	2.75
1/4	1 1/2	1/4	3/8	16	.0325	3.25	.04	4.00
1/4	1 1/2	1/4	3/8	14	.0375	3.75	.0475	4.75
1/4	1 1/2	1/4	3/8	13 or 12	.045	4.50	.055	5.50
1/4	1 1/2	1/4	3/8	12	.055	5.50	.065	6.50
1/4	1 1/2	1/4	3/8	11	.065	6.50	.075	7.50
1/4	1 1/2	1/4	3/8	11	.085	8.50	.105	10.50
1/4	1 1/2	1/4	3/8	10	.085	8.50	.105	10.50
1/4	1 1/2	1/4	3/8	9	.12	12.00	.145	14.50
1/4	1 1/2	1/4	3/8	8	.175	17.50	.21	21.00
1/4	1 1/2	1/4	3/8	7	.24	24.00	.285	28.50
1/4	1 1/2	1/4	3/8	7	.33	33.00	.39	39.00
1/4	1 1/2	1/4	3/8	6	.49	49.00	.57	57.00
1/4	1 1/2	1/4	3/8	6	.69	69.00	.78	78.00
1/4	1 1/2	1/4	3/8	5 1/2	.93	93.00	1.05	105.00
1/4	1 1/2	1/4	3/8	5	1.30	130.00	1.45	145.00
1/4	1 1/2	1/4	3/8	5	1.70	170.00	1.90	190.00
1/4	1 1/2	1/4	3/8	4 1/2	2.15	215.00	2.40	240.00
1/4	1 1/2	1/4	3/8	4 1/2	3.10	310.00	3.45	345.00
1/4	1 1/2	1/4	3/8	4	4.75	475.00	5.25	525.00
1/4	1 1/2	1/4	3/8	4	6.30	630.00	6.95	695.00
1/4	1 1/2	1/4	3/8	3 1/2	9.90	990.00	11.00	1100.00

Nuts finished top and bottom, use double chamfered list.

S. A. E. AND A. L. A. M. HEXAGON NUTS

PLAIN AND CASTELLATED

SEMI-FINISHED. MILLED FROM SOLID BAR
TAPPED AND FACED TRUE ON BOTTOM

Slotted Semi Finished Nuts furnished in U. S. S. Threads, slotting dimensions being the same as shown on castellated Nuts, Dimensions of nuts shown above.

Prices on above depending on quantities.

FIG. 1939—PLAIN

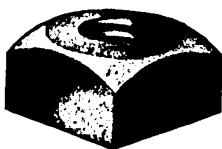
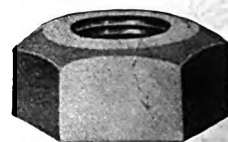
DIMENSIONS AND LIST PRICE PER HUNDRED

FIG. 1940—CASTELLATED

Plain and Castellated					Castellated						Prices			
Diam. of Screw	No. of Threads per inch	Diameter across Flats	Diam. of Facing	Depth of Facing	Height of Castle	Diam. of Castle	Number of Slots	Depth of Slot	Width of Slot	Diam. of Cotter Pin	Plain		Castellated	
											Thickness of Nut	Price per 100	Total Thickness	Price per 100
1/4	28	1 1/4	1 1/4	1/8	3/8	1 1/4	6	3/8	1/8	1 1/4	1 1/4	\$ 2.00	1 1/4	\$ 2.00
1/4	24	1 1/2	1 1/2	1/8	3/8	1 1/2	6	3/8	1/8	1 1/2	1 1/2	2.50	1 1/2	2.50
1/4	24	1 3/8	1 3/8	1/8	3/8	1 3/8	6	3/8	1/8	1 3/8	1 3/8	3.25	1 3/8	3.25
1/4	20	1 5/8	1 5/8	1/8	3/8	1 5/8	6	3/8	1/8	1 5/8	1 5/8	3.75	1 5/8	3.75
1/4	20	1 3/4	1 3/4	1/8	3/8	1 3/4	6	3/8	1/8	1 3/4	1 3/4	4.50	1 3/4	4.50
1/4	18	1 7/8	1 7/8	1/8	3/8	1 7/8	6	3/8	1/8	1 7/8	1 7/8	5.50	1 7/8	5.50
1/4	18	1 1/2	1 1/2	1/8	3/8	1 1/2	6	3/8	1/8	1 1/2	1 1/2	6.50	1 1/2	6.50
1/4	16	1	1	1/8	3/8	1	6	3/8	1/8	1	1	8.50	1	7.50
1/4	16	1 1/4	1 1/4	1/8	3/8	1 1/4	6	3/8	1/8	1 1/4	1 1/4	8.50	1 1/4	8.50
1/4	14	1 1/2	1 1/2	1/8	3/8	1 1/2	6	3/8	1/8	1 1/2	1 1/2	12.00	1 1/2	12.00
1/4	14	1 3/8	1 3/8	1/8	3/8	1 3/8	6	3/8	1/8	1 3/8	1 3/8	17.50	1 3/8	17.50
1/4	12	1 5/8	1 5/8	1/8	3/8	1 5/8	6	3/8	1/8	1 5/8	**	**	1 5/8	**
1/4	12	1 1/2	1 1/2	1/8	3/8	1 1/2	6	3/8	1/8	1 1/2	**	**	1 1/2	**
1/4	12	1 1/4	1 1/4	1/8	3/8	1 1/4	6	3/8	1/8	1 1/4	**	**	1 1/4	**
1/4	12	1 1/8	1 1/8	1/8	3/8	1 1/8	6	3/8	1/8	1 1/8	**	**	1 1/8	**
1/4	12	1 1/4	1 1/4	1/8	3/8	1 1/4	6	3/8	1/8	1 1/4	**	**	1 1/4	**

*A.L.A.M. Nuts have following outside diameters: 1/4" O.D. 3/8", 7/16" O.D. 1 1/8", 1/2" O.D. 1 1/8". **Prices on application.

COLD PUNCHED SQUARE AND HEXAGON NUTS

FIG. 1941
SQUARECHAMFERED, TRIMMED AND REAMED
U. S. STANDARDFIG. 1942
HEXAGON

Cold Punched C. T. R. Tapped Nuts are threaded with U. S. Form of threads, tapped exact and true to gauge. Trimmed outside to exact dimensions. Holes reamed to suit U. S. Standard Taps. Chamfered corners.

LIST PRICE PER HUNDRED POUNDS

LIST EFFECTIVE JAN. 1, 1906

Wide	Thick	Hole	Bolt	SQUARE				HEXAGON			
				Blank		Tapped		Blank		Tapped	
				Price per 100 Lbs.	No. in 100 Lbs.	Price per 100 Lbs.	No. in 100 Lbs.	Price per 100 Lbs.	No. in 100 Lbs.	Price per 100 Lbs.	No. in 100 Lbs.
$\frac{1}{2}$	$\frac{1}{4}$	$\frac{11}{16}$	$\frac{1}{4}$	\$20.00	6,710	\$22.00	7,040	\$27.00	7,900	\$29.50	8,320
$\frac{11}{16}$	$\frac{5}{16}$	$\frac{1}{4}$	$\frac{5}{16}$	18.00	3,880	19.50	4,070	24.00	4,520	26.00	4,740
$\frac{13}{16}$	$\frac{3}{8}$	$\frac{11}{16}$	$\frac{3}{8}$	14.50	2,500	15.60	2,630	18.50	2,950	20.10	3,120
$\frac{15}{16}$	$\frac{1}{2}$	$\frac{13}{16}$	$\frac{1}{2}$	14.00	1,650	14.90	1,740	18.00	1,900	19.30	2,010
$\frac{17}{16}$	$\frac{5}{8}$	$\frac{15}{16}$	$\frac{5}{8}$	11.30	1,180	12.00	1,240	14.00	1,360	15.00	1,440
$\frac{19}{16}$	$\frac{3}{4}$	$\frac{17}{16}$	$\frac{3}{4}$	11.30	850	11.90	900	14.00	1,025	14.90	1,090
$1\frac{1}{16}$	$\frac{7}{8}$	$\frac{19}{16}$	$\frac{7}{8}$	10.00	625	10.50	660	12.50	750	13.20	797
$1\frac{1}{4}$	1	2	1	9.70	380	10.10	400	11.40	460	12.00	491
$1\frac{3}{8}$	$1\frac{1}{8}$	$2\frac{1}{8}$	$1\frac{1}{8}$	9.60	250	10.00	266	11.10	305	11.70	328
$1\frac{1}{2}$	$1\frac{1}{4}$	$2\frac{1}{2}$	$1\frac{1}{4}$	9.60	170	10.00	181	11.10	212	11.70	228
$1\frac{3}{4}$	$1\frac{3}{4}$	$2\frac{3}{4}$	$1\frac{3}{4}$	9.60	125	10.00	134	11.10	151	11.70	162
2	2	3	2	10.10	96	10.50	103	11.50	111	12.10	120
$2\frac{1}{8}$	$2\frac{1}{8}$	$3\frac{1}{8}$	$2\frac{1}{8}$	10.30	73	10.80	78.5	12.00	88	12.70	95
$2\frac{1}{4}$	$2\frac{1}{4}$	$3\frac{1}{4}$	$2\frac{1}{4}$	10.70	58	11.30	62.5	12.60	68	13.40	73.5
$2\frac{1}{2}$	$2\frac{1}{2}$	$3\frac{1}{2}$	$2\frac{1}{2}$	11.10	45	11.80	48.7	13.20	53	14.10	57.6
$2\frac{3}{4}$	$2\frac{3}{4}$	$3\frac{3}{4}$	$2\frac{3}{4}$	11.50	35	12.20	38.3	14.00	42	14.90	45.8
$2\frac{7}{8}$	$2\frac{7}{8}$	$3\frac{7}{8}$	$2\frac{7}{8}$	12.00	29	12.80	31.5	14.50	35	15.50	38.3
3	3	4	3	12.00	24	12.90	26.3	14.50	29	15.60	31.8
$3\frac{1}{8}$	$3\frac{1}{8}$	$4\frac{1}{8}$	$3\frac{1}{8}$	12.50	17.4	13.60	19	15.00	24.8	16.20	27.3
$3\frac{1}{4}$	$3\frac{1}{4}$	$4\frac{1}{4}$	$3\frac{1}{4}$	13.50	12.7	14.80	13.8	15.00	21.5	16.30	23.7
$3\frac{1}{2}$	$3\frac{1}{2}$	$4\frac{1}{2}$	$3\frac{1}{2}$	14.00	9.6	15.40	10.5	16.00	18.3	17.40	20.1
$3\frac{3}{4}$	$3\frac{3}{4}$	$4\frac{3}{4}$	$3\frac{3}{4}$	14.50	7.5	16.00	8.2	16.00	15.6	17.50	17
4	4	5	4	14.50	6	16.10	6.6	16.50	12	18.10	13.3
$4\frac{1}{8}$	$4\frac{1}{8}$	$5\frac{1}{8}$	$4\frac{1}{8}$	14.50	4.82	16.20	5.3	17.00	9.4	18.70	10.4
$4\frac{1}{4}$	$4\frac{1}{4}$	$5\frac{1}{4}$	$4\frac{1}{4}$	15.50	3.93	17.20	4.32	17.00	7.4	18.80	8.2
$4\frac{1}{2}$	$4\frac{1}{2}$	$5\frac{1}{2}$	$4\frac{1}{2}$	15.50	3.23	17.20	3.55	17.00	5.9	18.90	6.6
$4\frac{3}{4}$	$4\frac{3}{4}$	$5\frac{3}{4}$	$4\frac{3}{4}$					18.00	4.8	19.90	5.3
5	5	6	5					18.00	4	19.90	4.4

MALLEABLE IRON WASHERS



FIG. 1955

PRICE PER POUND

For Bolt, Inch	$\frac{1}{2}$	$\frac{5}{8}$	$\frac{3}{4}$	$\frac{7}{8}$	1	$1\frac{1}{8}$	$1\frac{1}{4}$	$1\frac{1}{2}$	$1\frac{3}{4}$	2
Diameter, inches.....	$2\frac{1}{2}$	$2\frac{3}{4}$	3	$3\frac{1}{2}$	4	$4\frac{1}{2}$	5	6	6	$7\frac{1}{4}$
Thickness, inch.....	$\frac{1}{4}$	$\frac{5}{16}$	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{5}{8}$	$\frac{3}{4}$	$\frac{3}{4}$	$\frac{1}{2}$
Weight of 100 Washers, pounds.....	15	22	33	50	68	87	150	190	206	420
Price, per pound.....	\$.12	.12	.12	.12	.12	.12	.12	.12	.12	.12

Two hundred pounds in a keg.

DRAKE LOCK NUT

NO WASHER NEEDED—FOR ALL POINTS WHERE HEAVY VIBRATION OCCURS

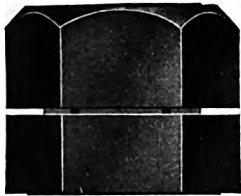


FIG. 1947

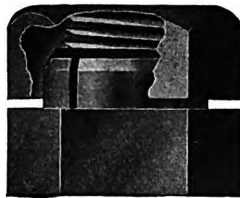


FIG. 1948

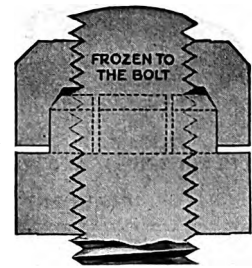


FIG. 1949

MADE FROM SPECIAL SCREW STOCK STEEL, TURNED FROM SOLID BAR

PRICE PER HUNDRED

Nut Size		Threads Per Inch	Total Height of Nut	Threads in Nut Member	Shipping Weight in Pounds per 100 Nuts	Boxed	Price Per Hundred
3/8	S. A. E.	24	1/2	8	3	100	\$ 5.00
	U. S. S.	16	5/8	6	6 1/2		6.50
1/2	A.L.A.M.	20	1 1/4	7	5	100	6.50
	U. S. S.	14	1 1/4	6	9		7.50
1/2	S. A. E.	20	1 1/4	9	7	100	8.00
	U. S. S.	13	1 1/4	6	13		9.00
1/2	S. A. E.	18	1 1/4	9	10 1/2	100	10.00
	U. S. S.	12	1 1/4	6	17		11.00
5/8	S. A. E.	18	1 1/4	10	16	50	12.00
	U. S. S.	11	1 1/4	7	24		13.00
3/4	A.L.A.M.	16	1 1/2	12	21	50	16.00
	U. S. S.	10	1 1/2	8	37		17.00
3/4	S. A. E.	14	1 1/2	12	30	50	21.00
	U. S. S.	9	1 1/2	8	52		24.00
1"	U. S. S.	8	1 1/2	8	75	50	35.00
	U. S. S.	7	1 1/2	8	95	50	48.00
1 1/4	U. S. S.	7	1 3/4	9	127	50	66.00
	U. S. S.	6	2 1/4	9	200	20	138.00
1 3/4	U. S. S.	5	2 1/4	8	380	20	260.00
	U. S. S.	4 1/2	2 3/4	8	575	20	430.00

IN ASSORTED BOXES OF 100 AS FOLLOWS:

Assortment No. 1 S.A.E. 3/8-40, 1/2-30, 1/2-30.

List Price \$6.35

Assortment No. 3 U.S.S. 3/8-40, 1/2-20, 1/2-40.

List Price \$7.70

Assortment No. 2 S.A.E. 3/8-28, 1/2-24, 1/2-20,

List Price \$7.80

Assortment No. 4 U.S.S. 3/8-35, 1/2-10, 1/2-35.

List Price \$9.00

CAST IRON WASHERS

PRICE PER POUND

For Bolt, Inches	1/2	5/8	3/4	7/8	1	1 1/8	1 1/4	1 1/2
Holes, Inches	5/8	3/4	7/8	1	1 1/8	1 1/4	1 3/8	1 3/4
Diameter of Washer, In	2 1/2	2 3/4	3	3 1/2	4	4 1/2	5	6
Thickness, Inches	1 1/4	3/4	1 1/4	1 1/4	1 1/4	1	1 1/4	1 1/4
Weight Each, Lbs.	1/2	5/8	9/10	1 1/4	1 1/4	2 1/4	3	5
Per Pound	\$.06	.06	.06	.06	.06	.06	.06	.06

FIG. 1954

LOCK WASHERS



FIG. 1950
PLAIN AND S. A. E.



FIG. 1951
POSITIVE



FIG. 1952
RIBBED

PLAIN PATTERN

Bolt Size	Steel Size	Price 100	Price 1000
4 or $\frac{3}{8}$	$\frac{3}{8}$ x $\frac{3}{8}$	\$0.39	\$ 3.25
6 or $\frac{1}{2}$	$\frac{3}{8}$ x $\frac{3}{8}$	.33	2.70
	$\frac{3}{8}$ x $\frac{1}{2}$	.28	2.35
	$\frac{1}{2}$ x $\frac{1}{2}$	.44	3.70
	$\frac{1}{2}$ x $\frac{3}{4}$	.52	4.35
	$\frac{3}{4}$ x $\frac{3}{4}$	.68	5.70
	$\frac{3}{4}$ x $\frac{1}{2}$	.84	7.00
	$\frac{1}{2}$ x $\frac{1}{2}$	.92	7.70
	$\frac{1}{2}$ x $\frac{3}{4}$	1.20	10.00
	$\frac{3}{4}$ x $\frac{3}{4}$	1.30	11.00
	$\frac{1}{2}$ x $\frac{1}{2}$	1.90	15.70
	$\frac{1}{2}$ x $\frac{3}{4}$	2.32	19.35
1	$\frac{1}{2}$ x $\frac{1}{2}$	2.64	22.00

POSITIVE PATTERN

Bolt Sizes	Steel Size	Price 100	Price 1000
$\frac{3}{8}$	$\frac{3}{8}$ x $\frac{3}{8}$	\$0.44	\$ 3.70
$\frac{1}{4}$	$\frac{1}{2}$ x $\frac{1}{2}$	.64	5.35
	$\frac{1}{2}$ x $\frac{1}{2}$	.72	6.00
	$\frac{3}{8}$ x $\frac{1}{2}$	.88	7.35
	$\frac{1}{2}$ x $\frac{1}{2}$	1.04	8.70
	$\frac{1}{2}$ x $\frac{1}{2}$	1.12	9.35
	$\frac{1}{2}$ x $\frac{3}{4}$	1.40	11.70
	$\frac{3}{4}$ x $\frac{3}{4}$	1.52	12.70
	$\frac{1}{2}$ x $\frac{3}{4}$	2.12	17.70
	$\frac{1}{2}$ x $\frac{1}{2}$	2.40	20.00
1	$\frac{1}{2}$ x $\frac{3}{4}$	2.72	22.70
...
...

FORD SPECIAL

$\frac{3}{8}$	$\frac{1}{2}$ x $\frac{1}{2}$	\$0.60	\$5.00
S. A. E. PATTERN			
$\frac{3}{8}$	$\frac{1}{2}$ x $\frac{3}{4}$	\$0.16	\$ 1.35
$\frac{1}{4}$	$\frac{1}{2}$ x $\frac{1}{2}$	.32	2.70
$\frac{3}{8}$	$\frac{1}{2}$ x $\frac{3}{4}$	.60	5.00
$\frac{1}{2}$	$\frac{1}{2}$ x $\frac{3}{4}$	.68	5.70
$\frac{3}{4}$	$\frac{1}{2}$ x $\frac{3}{4}$	1.16	9.70
$\frac{1}{2}$	$\frac{1}{2}$ x $\frac{1}{2}$	1.24	10.35
$\frac{3}{4}$	$\frac{1}{2}$ x $\frac{3}{4}$	1.60	13.35
$\frac{1}{2}$	$\frac{1}{2}$ x $\frac{3}{4}$	1.72	14.35
$\frac{3}{4}$	$\frac{1}{2}$ x $\frac{3}{4}$	2.36	19.70
$\frac{1}{2}$	$\frac{1}{2}$ x $\frac{3}{4}$	2.72	22.70
1	$\frac{1}{2}$ x $\frac{3}{4}$	3.96	33.00

NATIONAL OR RIBBED PATTERN

$\frac{3}{8}$	$\frac{3}{8}$ x $\frac{3}{8}$	\$0.32	\$ 2.70
$\frac{1}{4}$	$\frac{1}{2}$ x $\frac{1}{2}$	.56	4.70
	$\frac{1}{2}$ x $\frac{1}{2}$	.68	5.70
	$\frac{3}{8}$ x $\frac{1}{2}$	.92	7.70
	$\frac{1}{2}$ x $\frac{1}{2}$	1.00	8.35
	$\frac{1}{2}$ x $\frac{1}{2}$	1.08	9.00
	$\frac{1}{2}$ x $\frac{3}{4}$	1.20	10.00
	$\frac{3}{4}$ x $\frac{3}{4}$	1.32	11.00
	$\frac{1}{2}$ x $\frac{3}{4}$	2.12	17.70
	$\frac{1}{2}$ x $\frac{1}{2}$	2.40	20.00
1	$\frac{1}{2}$ x $\frac{3}{4}$	2.75	22.70
...
...
...

WROUGHT STEEL WASHERS



FIG. 1953

PRICE PER HUNDRED POUNDS

For Bolt Inch	Diameter Inch	Hole Inch	Gauge No.	No. in 100 Pounds	Price Per 100 Lbs.	For Bolt In.	Diam. Inch	Hole Inch	Gauge No.	No. in 100 Pounds	Price Per 100 Lbs.
$\frac{3}{8}$	$\frac{3}{8}$	$\frac{1}{4}$	18	39,400	\$14.00	1	$2\frac{1}{2}$	$1\frac{1}{8}$	8	568	\$9.00
$\frac{1}{4}$	$\frac{3}{4}$	$\frac{1}{8}$	16	15,600	12.20	$1\frac{1}{8}$	$2\frac{3}{4}$	$1\frac{1}{4}$	8	473	9.00
$\frac{3}{8}$	$\frac{1}{2}$	$\frac{3}{8}$	16	11,250	11.40	$1\frac{1}{4}$	3	$1\frac{3}{8}$	8	364	9.20
$\frac{1}{2}$	1	$\frac{1}{2}$	14	6,800	10.50	$1\frac{3}{8}$	$3\frac{1}{4}$	$1\frac{1}{2}$	7	275	9.20
$\frac{3}{4}$	$1\frac{1}{4}$	$\frac{3}{4}$	14	4,300	9.80	$1\frac{1}{2}$	$3\frac{1}{2}$	$1\frac{5}{8}$	7	256	9.20
$\frac{1}{2}$	$1\frac{3}{8}$	$\frac{1}{2}$	12	2,600	9.40	$1\frac{5}{8}$	$3\frac{3}{4}$	$1\frac{3}{4}$	7	220	9.50
$\frac{3}{8}$	$1\frac{1}{2}$	$\frac{3}{8}$	12	2,250	9.30	$1\frac{3}{4}$	4	$1\frac{7}{8}$	7	197	9.50
$\frac{1}{2}$	$1\frac{3}{4}$	$\frac{1}{2}$	10	1,300	9.20	$1\frac{7}{8}$	$4\frac{1}{4}$	2	7	174	9.50
$\frac{3}{4}$	2	$\frac{3}{4}$	9	900	9.10	2	$4\frac{1}{2}$	$2\frac{1}{8}$	7	160	9.50
$\frac{1}{2}$	$2\frac{1}{4}$	$\frac{1}{2}$	8	782	9.00	...	...	...	.	...	....

Two hundred pounds in a keg.

TINNERS RIVETS

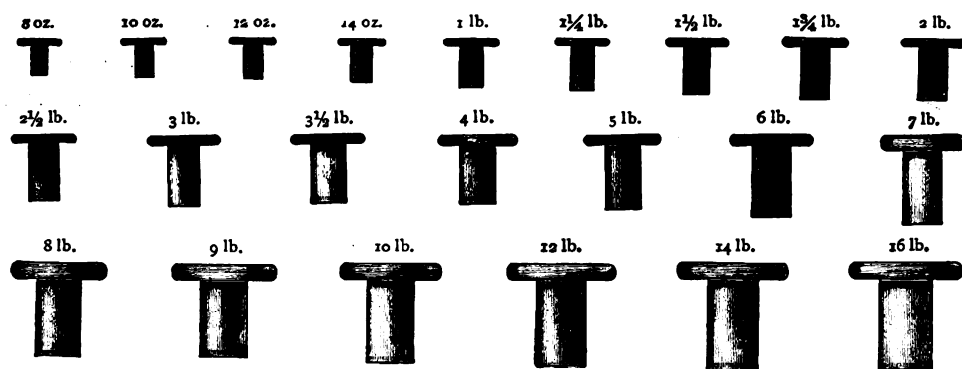


FIG. 1956

PRICE IN PACKAGES OF 1000 RIVETS

ADOPTED MARCH 19, 1913

Weight	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{5}{8}$	$\frac{3}{4}$	$\frac{7}{8}$	1	$1\frac{1}{4}$	$1\frac{1}{2}$
Black.....per 1000	\$.20	\$.22	\$.24	\$.26	\$.28	\$.29	\$.32	\$.37
" Metallic Tinned....."	.28	.31	.35	.39	.43	.47	.54	.64
" Tin-plated....."	.24	.26	.29	.32	.35	.37	.42	.49
Weight	$1\frac{3}{4}$	2	$2\frac{1}{2}$	3	$3\frac{1}{2}$	4	5	6
Black.....per 1000	\$.41	\$.44	\$.56	\$.62	\$.72	\$.79	\$1.00	\$1.12
" Metallic Tinned....."	.72	.79	1.00	1.15	1.34	1.49	1.88	2.17
" Tin-plated....."	.55	.59	.75	.85	.99	1.09	1.38	1.57
Weight	7	8	9	10	12	14	16	....
Black.....per 1000	\$1.31	\$1.50	\$1.68	\$1.77	\$2.06	\$2.40	\$2.77	....
" Metallic Tinned....."	2.54	2.90	3.26	3.52	4.16	4.85	5.57	....
" Tin-plated....."	1.84	2.10	2.36	2.52	2.96	3.45	3.97	....

For oval or countersunk heads, shoulder or pointed, or extra length rivets, add \$.10 per 1000 for each specialty.

PRICE IN BULK

Weight	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{5}{8}$	$\frac{3}{4}$	$\frac{7}{8}$	1	$1\frac{1}{4}$	$1\frac{1}{2}$
Black.....per pound	\$.48	\$.42	\$.38	\$.35	\$.33	\$.30	\$.27	\$.26
Weight	$1\frac{3}{4}$	2	$2\frac{1}{2}$	3	$3\frac{1}{2}$	4	5	6
Black.....per pound	\$.25	\$.24	\$.24	\$.23	\$.23	\$.22	\$.22	\$.21
Weight	7	8	9	10	12	14	16	....
Black.....per pound	\$.21	\$.21	\$.21	\$.20	\$.19½	\$.19½	\$.19½	....

List extras: For oval head and shoulder, or extra length rivets, add \$.02 per pound to list price for each specialty.

Net extras: For tin or copper plating, add \$.01½, and for metallic tinning, add \$.03½ per pound to net prices. When "inned" rivets are ordered, metallic tinned are furnished. For bright polishing rivets after annealing, add \$.25 net extra per cwt.

List rebates: For 25 and 50-pound boxes, deduct \$.02; for 100-pound boxes, deduct \$.03, and for 100 and 200-pound kegs deduct \$.04 per pound from list price.

APPROXIMATE DIMENSIONS OF TINNERS RIVETS

Weight	$\frac{1}{2}$	$\frac{5}{8}$	$\frac{3}{4}$	$\frac{7}{8}$	1	$1\frac{1}{4}$	$1\frac{1}{2}$	$1\frac{3}{4}$
Length.....inches	$\frac{1}{2}$	$\frac{11}{16}$	$\frac{1}{2}$	$\frac{11}{16}$	$\frac{11}{16}$	$\frac{7}{8}$	$\frac{11}{16}$	$\frac{1}{2}$
Diameter, Wire Gauge.....no.	13½	13	12½	12	11¾	11	10½	10
Weight	2	$2\frac{1}{2}$	3	$3\frac{1}{2}$	4	5	6	7
Length.....inches	$\frac{11}{16}$	$\frac{1}{2}$	$\frac{11}{16}$	$\frac{11}{16}$	$\frac{11}{16}$	$\frac{3}{4}$	$\frac{11}{16}$	$\frac{11}{16}$
Diameter, Wire Gauge.....no.	9½	9	8½	8	7½	6¾	6	5½
Weight	8	9	10	12	14	16	....	....
Length.....inches	$\frac{1}{2}$	$\frac{11}{16}$	$\frac{11}{16}$	$\frac{1}{2}$	$\frac{11}{16}$	$\frac{11}{16}$	....	....
Diameter, Wire Gauge.....no.	4¾	4½	4	3	2	1	....	....

FLAT AND ROUND HEAD IRON RIVETS



FIG. 1957



FIG. 1958

LIST PRICE PER POUND. PACKED IN 5 LB. OR 10 LB. BOXES

LIST OF JANUARY 8, 190

Size Wire.	Length, Inch																
	One in. and Longer	$\frac{7}{8}$	$\frac{3}{4}$	$\frac{5}{8}$ & $\frac{1}{2}$	$\frac{1}{2}$	$\frac{7}{16}$	$\frac{1}{2}$	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{5}{16}$	$\frac{3}{16}$	$\frac{1}{4}$	$\frac{5}{16}$	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{3}{4}$	$\frac{1}{2}$
$\frac{1}{2}$ or $\frac{1}{8}$	\$.19	\$.19 $\frac{1}{2}$	\$.19 $\frac{1}{2}$	\$.20	\$.21	\$.21	\$.21	\$.22	\$.22	\$.23	\$.23	\$.24	\$.24	\$.24	\$.25	\$.25	\$.26
$\frac{3}{8}$	.19	.19 $\frac{1}{2}$	.19 $\frac{1}{2}$	.20	.21	.21	.21	.22	.22	.23	.23	.24	.24	.24	.25	.25	.26
$\frac{1}{4}$	.19 $\frac{1}{2}$	.20	.20	.20 $\frac{1}{2}$	.21	.22	.22	.23	.23	.23	.23	.24	.24	.24	.25	.25	.26
$\frac{3}{16}$	.19 $\frac{1}{2}$	.20	.20	.20 $\frac{1}{2}$	.21	.22	.22	.23	.23	.23	.23	.24	.24	.24	.25	.25	.26
1	.20	.20 $\frac{1}{2}$	.20 $\frac{1}{2}$	.21	.22	.22	.23	.23	.23	.23	.23	.24	.24	.24	.25	.25	.26
$\frac{1}{2}$ or $\frac{3}{16}$	.20	.20 $\frac{1}{2}$	.20 $\frac{1}{2}$	.21	.22	.22	.23	.23	.23	.23	.23	.24	.24	.24	.25	.25	.26
3	.20	.20 $\frac{1}{2}$	.20 $\frac{1}{2}$	.21	.22	.22	.23	.23	.23	.23	.23	.24	.24	.24	.25	.25	.26
$\frac{1}{4}$	.20	.20 $\frac{1}{2}$	.20 $\frac{1}{2}$	.21	.22	.22	.23	.23	.23	.23	.23	.24	.24	.24	.25	.25	.26
4	.21	.21 $\frac{1}{2}$	.21 $\frac{1}{2}$	.22	.23	.23	.24	.24	.24	.24	.24	.25	.25	.25	.26	.26	.27
5 or $\frac{7}{16}$	.21	.21 $\frac{1}{2}$	.21 $\frac{1}{2}$	.22	.23	.23	.24	.24	.24	.24	.24	.25	.25	.25	.26	.26	.27
6	.21	.21 $\frac{1}{2}$	.21 $\frac{1}{2}$	.22	.23	.23	.24	.24	.24	.25	.25	.26	.26	.26	.27	.27	.28
$\frac{3}{8}$	.21	.21 $\frac{1}{2}$	.21 $\frac{1}{2}$	.22	.23	.23	.24	.24	.24	.25	.25	.26	.26	.26	.27	.27	.28
7	.21	.21 $\frac{1}{2}$	.22	.23	.24	.24	.24	.24	.25	.25	.25	.26	.26	.26	.27	.27	.28
8 or $\frac{5}{16}$	.22	.22 $\frac{1}{2}$	.22 $\frac{1}{2}$	.23	.24	.25	.25	.25	.26	.26	.26	.27	.27	.27	.28	.29	.30
9	.23	.23 $\frac{1}{2}$	.23 $\frac{1}{2}$	.24	.25	.26	.26	.27	.27	.27	.29	.29	.29	.30	.31	.31	.32
10	.24	.24 $\frac{1}{2}$	.24 $\frac{1}{2}$	.25	.26	.27	.28	.29	.31	.33	.34	.34	.36	.36	.39	.41	.43
11 or $\frac{1}{8}$	.25	.25 $\frac{1}{2}$	.25 $\frac{1}{2}$	.26	.28	.30	.32	.33	.34	.36	.37	.37	.39	.43	.46	.48	.50
12	.26	.26 $\frac{1}{2}$	.26 $\frac{1}{2}$	.27	.30	.32	.34	.35	.36	.38	.40	.41	.42	.47	.51	.56	.60
13 or $\frac{3}{16}$	.30	.30 $\frac{1}{2}$	.30 $\frac{1}{2}$	.31	.33	.36	.39	.40	.41	.43	.45	.46	.47	.51	.56	.61	.66
14	.32	.32 $\frac{1}{2}$	.32 $\frac{1}{2}$	.33	.36	.41	.44	.46	.51	.56	.58	.61	.64	.64	.66	.69	.74

Rivets made from smaller wire than No. 14, all lengths, list 80 cents per pound. Intermediate lengths and diameters take List Price of next smaller size.

For 25 or 50 pound Boxes deduct 2 cents per pound from the List Price.

For 100 or 200 pound Kegs, deduct 4 cents per pound from the List Price.

BOILER AND STRUCTURAL RIVETS

FIG. 1959
CONE HEADFIG. 1960
BUTTON HEAD

CONE HEAD

$\frac{1}{2}$ in. Diameter, Length in., $\frac{3}{4}$, $\frac{7}{8}$, 1, $1\frac{1}{8}$, $1\frac{1}{4}$, $1\frac{3}{8}$, $1\frac{1}{2}$, $1\frac{5}{8}$, $1\frac{3}{4}$, 2, $2\frac{1}{4}$, $2\frac{1}{2}$, 3.
 $\frac{3}{8}$ in. Diameter, Length in., 1, $1\frac{1}{8}$, $1\frac{1}{4}$, $1\frac{3}{8}$, $1\frac{1}{2}$, $1\frac{5}{8}$, $1\frac{3}{4}$, $1\frac{7}{8}$, 2, $2\frac{1}{8}$, $2\frac{1}{4}$, $2\frac{3}{8}$, $2\frac{1}{2}$, $2\frac{3}{4}$, $2\frac{7}{8}$, 3, $3\frac{1}{4}$, $3\frac{1}{2}$, 4, $4\frac{1}{2}$, 5.
 $\frac{1}{4}$ in. Diameter, Length in., $1\frac{1}{4}$, $1\frac{3}{8}$, $1\frac{1}{2}$, $1\frac{5}{8}$, $1\frac{3}{4}$, $1\frac{7}{8}$, 2, $2\frac{1}{8}$, $2\frac{1}{4}$, $2\frac{3}{8}$, $2\frac{1}{2}$, $2\frac{3}{4}$, 3, $3\frac{1}{4}$, $3\frac{1}{2}$, $3\frac{3}{4}$, 4, $4\frac{1}{2}$, 5, 6.
 $\frac{3}{16}$ in. Diameter, Length in., $1\frac{3}{4}$, $1\frac{7}{8}$, 2, $2\frac{1}{8}$, $2\frac{1}{4}$, $2\frac{3}{8}$, $2\frac{1}{2}$, $2\frac{3}{4}$, 3, $3\frac{1}{4}$, $3\frac{1}{2}$, $3\frac{3}{4}$, 4, $4\frac{1}{2}$, 5.
 $\frac{1}{8}$ in. Diameter, Length in., 2, $2\frac{1}{4}$, $2\frac{1}{2}$, $2\frac{3}{4}$, 3, $3\frac{1}{2}$, 4, $4\frac{1}{2}$, 5, 6.

BUTTON HEAD

$\frac{1}{2}$ in. Diameter, Length in., $\frac{5}{8}$, $\frac{3}{4}$, $\frac{7}{8}$, 1, $1\frac{1}{4}$, $1\frac{1}{2}$, $1\frac{3}{4}$, 2, $2\frac{1}{2}$.
 $\frac{3}{8}$ in. Diameter, Length in., 1, $1\frac{1}{4}$, $1\frac{1}{2}$, $1\frac{3}{4}$, $1\frac{7}{8}$, 2, $2\frac{1}{8}$, $2\frac{1}{4}$, $2\frac{3}{8}$, $2\frac{1}{2}$, $2\frac{3}{4}$, 3.
 $\frac{1}{4}$ in. Diameter, Length in., $1\frac{1}{4}$, $1\frac{1}{2}$, $1\frac{3}{4}$, $1\frac{7}{8}$, 2, $2\frac{1}{8}$, $2\frac{1}{4}$, $2\frac{3}{8}$, $2\frac{1}{2}$, $2\frac{3}{4}$, 3, $3\frac{1}{4}$, $3\frac{1}{2}$, 4.

STANDARD LIST OF EXTRAS

Base Sizes— $\frac{3}{4}$ to $1\frac{1}{4}$ in. dia. inc.; 2 to 5 in. long, inc.... Base
 $\frac{1}{2}$ and $\frac{3}{8}$ in. diameter, add to Base per 100 lbs.....\$.50
 $\frac{5}{8}$ and $\frac{1}{2}$ in. diameter, add to Base per 100 lbs..... .15
 Larger than $1\frac{1}{4}$ in. dia., add to Base per 100 lbs..... .25
 Per 100 pounds
 Lengths 1 in. and shorter, add to Base per 100 lbs.....\$.50
 " over 1 and less than 2 in., add to base per 100 lbs... .25
 Lengths over 5 in., add to Base per 100 lbs..... .25
 Per 100 pounds

BOILER AND STRUCTURAL RIVETS, 200 LBS. IN A KEG

COPPER BELT RIVETS AND BURRS

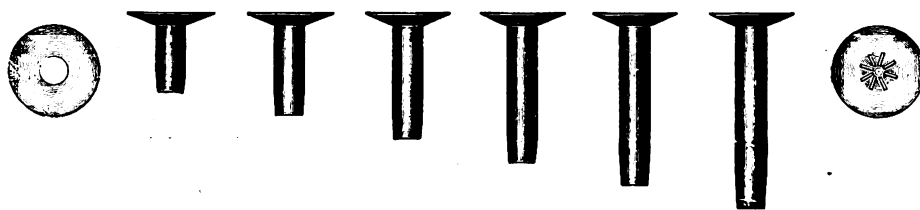


FIG. 1961

UNIFORM LENGTHS
IN ONE POUND BOXES

PRICE PER POUND

No. 5—Lengths $\frac{3}{8}$, $\frac{7}{8}$, 1, $1\frac{1}{4}$, $1\frac{1}{2}$ in.....	\$.98
No. 7—Lengths $\frac{3}{8}$, $\frac{7}{8}$, $\frac{1}{2}$, $\frac{5}{8}$, $\frac{3}{4}$, $\frac{7}{8}$, 1, $1\frac{1}{4}$, $1\frac{1}{2}$ in..	.98
No. 8—Lengths $\frac{1}{4}$, $\frac{3}{8}$, $\frac{1}{2}$, $\frac{5}{8}$, $\frac{3}{4}$, $\frac{7}{8}$, 1, $1\frac{1}{4}$, $1\frac{1}{2}$ in.....	1.00
No. 9—Lengths $\frac{1}{4}$, $\frac{3}{8}$, $\frac{1}{2}$, $\frac{5}{8}$, $\frac{3}{4}$, $\frac{7}{8}$, 1, $1\frac{1}{4}$ in...	1.04
No. 10—Lengths $\frac{1}{4}$, $\frac{3}{8}$, $\frac{1}{2}$, $\frac{5}{8}$, $\frac{3}{4}$, $\frac{7}{8}$, 1 in.....	1.08
No. 12—Lengths $\frac{1}{4}$, $\frac{3}{8}$, $\frac{1}{2}$, $\frac{5}{8}$, $\frac{3}{4}$, $\frac{7}{8}$, 1 in.....	1.16

IN HALF-POUND BOXES

No. 7—Lengths $\frac{3}{8}$, $\frac{1}{2}$, $\frac{5}{8}$, $\frac{3}{4}$, $\frac{7}{8}$, 1, $1\frac{1}{4}$, $1\frac{1}{2}$ in.....	\$1.04
No. 8—Lengths $\frac{1}{4}$, $\frac{3}{8}$, $\frac{1}{2}$, $\frac{5}{8}$, $\frac{3}{4}$, $\frac{7}{8}$, 1, $1\frac{1}{4}$, $1\frac{1}{2}$ in.....	1.06
No. 9—Lengths $\frac{1}{4}$, $\frac{3}{8}$, $\frac{1}{2}$, $\frac{5}{8}$, $\frac{3}{4}$, $\frac{7}{8}$, 1, $1\frac{1}{4}$ in.....	1.10
No. 10—Lengths $\frac{1}{4}$, $\frac{3}{8}$, $\frac{1}{2}$, $\frac{5}{8}$, $\frac{3}{4}$, $\frac{7}{8}$, 1 in.....	1.14
No. 12—Lengths $\frac{1}{4}$, $\frac{3}{8}$, $\frac{1}{2}$, $\frac{5}{8}$, $\frac{3}{4}$, $\frac{7}{8}$, 1 in.....	1.22

ASSORTED LENGTHS
IN ONE POUND BOXES

PRICE PER POUND

No. 8—Lengths $\frac{3}{8}$ to $\frac{3}{4}$ in.....	\$1.06
No. 8—Lengths $\frac{3}{8}$ to 1 in.....	1.06
No. 9—Lengths $\frac{3}{8}$ to $\frac{3}{4}$ in.....	1.10
No. 9—Lengths $\frac{3}{8}$ to 1 in.....	1.10

IN HALF-POUND BOXES

No. 7—Lengths $\frac{3}{8}$ to $\frac{3}{4}$ in.....	\$1.10
No. 8—Lengths $\frac{3}{8}$ to $\frac{3}{4}$ in.....	1.12
No. 9—Lengths $\frac{3}{8}$ to $\frac{3}{4}$ and $\frac{3}{8}$ to 1 in.....	1.16
No. 10—Lengths $\frac{3}{8}$ to $\frac{3}{4}$ in.....	1.20
No. 12—Lengths $\frac{3}{8}$ to $\frac{3}{4}$ in.....	1.28

IN QUARTER-POUND BOXES

No. 8—Assorted Lengths $\frac{3}{8}$ to $\frac{3}{4}$ in.....	\$1.16
No. 9—Assorted Lengths $\frac{3}{8}$ to $\frac{3}{4}$ in.....	1.20

TABLE SHOWING NUMBER OF COPPER RIVETS AND BURRS TO THE POUND

Inches.....	$\frac{1}{4}$	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{5}{8}$	$\frac{3}{4}$	$\frac{7}{8}$	1	$1\frac{1}{4}$	$1\frac{1}{2}$	Burrs		
No. 5.....	....	....	64	60	53	....	46	44	36	32	85	
No. 6.....	....	105	96	92	74	68	61	56	50	46	180	
No. 7.....	211	171	160	150	140	132	110	97	91	72	63	368
No. 8.....	266	227	200	172	157	147	136	116	100	88	71	417
No. 9.....	365	261	248	228	220	184	169	156	133	113	99	600
No. 10.....	411	336	305	257	249	223	206	180	162	....	....	820
No. 12.....	545	400	342	325	308	292	257	221	190	....	....	1167

COPPER BELT RIVETS ONLY

Price per Pound

No. 7—Lengths $\frac{3}{8}$, $\frac{1}{2}$, $\frac{5}{8}$, $\frac{3}{4}$, $\frac{7}{8}$, 1 in.....	\$.98
No. 8—Lengths $\frac{3}{8}$, $\frac{1}{2}$, $\frac{5}{8}$, $\frac{3}{4}$, $\frac{7}{8}$, 1 in.....	1.00
No. 9—Lengths $\frac{3}{8}$, $\frac{1}{2}$, $\frac{5}{8}$, $\frac{3}{4}$, in.....	1.04
No. 10—Lengths $\frac{3}{8}$, $\frac{3}{4}$, $\frac{7}{8}$, 1 in.....	1.08
No. 12—Lengths $\frac{1}{2}$, $\frac{5}{8}$ in.....	1.16

COPPER BURRS ONLY

No. For Rivets No. Price per Pound

5	5	\$.98
7	7	.98
8	8	1.00
9	9	1.04
10	10	1.08
12	12	1.16

BIFURCATED RIVETS



FIG. 1962

MADE OF STEEL, COPPER PLATED. WIRE $\frac{1}{16}$ IN. IN DIAMETER

In ordering Rivets always specify thickness of Belt, as different lengths of Rivets must be used according to thickness of Belt.

Rivets should be $\frac{1}{16}$ or $\frac{1}{4}$ inch longer than the thickness of the Belt to allow for thickness of plate and proper clinching.

PRICE LIST

Size Inch	Price per Gross
$\frac{1}{16}$, $\frac{9}{16}$, $\frac{1}{8}$ and $\frac{5}{16}$	\$.60
$\frac{3}{16}$ and $\frac{10}{16}$.....	.68
$\frac{1}{4}$ and $\frac{12}{16}$.....	.75
$\frac{5}{8}$ and $\frac{14}{16}$.....	.85

Packed one gross in a box.

BRAKE BAND RIVETS

COPPER, COUNTERSUNK HEAD



FIG. 1963

For automobile brake band construction and repairwork.

Size No.	Length, inch	Price per Pound
5—1		\$1.02
6—1½, ¾, 1		1.02
7—1½, ¾		1.02
8—1½, ¾, 1		1.02
9—1½, ¾		1.02
10—1½, ¾, ¾		1.02
12—¾		1.13

BRIGHT IRON BURRS

LIST PRICE, PER POUND

Size	Price	Outside Diam	Thickness	Number in One Pound
½	\$.36	1¼	.109	35
¾	.36	1	.083	75
1	.36	7/8	.072	120
1½	.36	¾	.072	146
2	.36	¾	.072	148
2½	.36	11/16	.072	160
3	.36	11/16	.065	170
3½	.36	11/16	.065	180
4	.37	5/8	.065	244
5	.38	5/8	.065	248
6	.42	1/2	.058	296
7	.42	1/2	.058	400
8	.43	1/2	.058	528
9	.44	1/2	.049	516
10	.45	1/2	.042	592
11	.47	11/16	.042	668
12	.50	11/16	.035	844
13	.60	11/16	.035	912
14	.70	11/16	.032	980
15	.80	11/16	.032	1056
16		11/16	.032	1104

BRASS BURRS

Diameters and thicknesses are approximate only.

Size, number	7	8	9	10	12
Inside Diam in.	11/16	3/4	7/8	1	1 1/8
Outside Diam. in.	1/2	1/2	11/16	11/16	11/16
Thickness, in.	.050	.045	.36	.036	.028
Price per lb					

BLACK IRON BURRS

FOR FLAT AND ROUND HEAD IRON RIVETS

In One Pound Boxes

Size	3/8	11/16	5/8	1	2	1 1/4
Price per lb	\$.48	.48	.48	.48	.48	.48
Size	4	5	6	7	8	
Price per lb	\$.49	.56	.56	.56	.58	.59
Size	9	10	11	12	13	14
Price per lb	\$.60	.65	.67	.80	.94	1.07

SPECIAL FORGED STEEL RIVET SETS.

GUN METAL FINISH.



FIG. 1964

RIVET SETS

These Sets forged from a high quality steel are made with a view to satisfactorily filling the requirements of hard service. They embody not only the best materials but the highest grade workmanship. Highly adapted for workers in sheet iron, copper, brass, etc.

Size	00	0	1	2	3	4	5	6	7	8
Size of hole, in.	1/16	1/8	1/4	.2130	.1910	.1660	.1495	.1405	.1285	.1100
Size Drill ga.	1/16	1/8	1/4	3	11	19	25	28	30	35
No.	1/16	1/8	1/4	3	11	19	25	28	30	35
For Iron Rivets										
lbs.	14	10-12	7-8	6	4-5	2 1/2-3	1 3/4-2	1 1/2	1-1 1/4	10-12 oz
"Cop'r" nos.	5	6	7	8	9	10	12	13	14	
" " " ins.	1/4	1/8	1/4	1/2	3/4	1	1 1/8	1 1/4	1 1/2	
Price, each	\$.75	.75	.65	.65	.50	.50	.40	.40	.35	.35

GRANT NOISELESS ROTARY RIVETING MACHINES

With the Grant Rotary Rivet Spinning Machine, illustrated next page, an unusually diversified range of articles may be riveted together by a method not requiring a succession of hammer-like, nerve-racking blows; but by an absolutely noiseless and blowless method, producing results far greater in quantity, superior in finish and uniformity and more dependable than any other machine on the market to-day.

The design and detail of construction have been carefully worked out. For strength, workmanship, quality of material, appearance and general utility, they are unsurpassed.

The capacity of these machines is unequalled by any riveting machine of the blow type, and the work produced will be uniform from the smallest rivet up to $\frac{3}{8}$ " shank.

Articles requiring flexibility after riveting may be riveted with absolute uniformity, if the parts themselves are individually uniform.

The specially shaped twin rolls which are placed in the holder at the lower end of the revolving spindle, when brought in contact with the rivet shank, produce a condition which causes each half of said rolls to revolve independently on its axis, thereby rolling or swedging the rivet shank into the form desired.

The finished head on the rivet shank is, in all cases, perfectly smooth, no riveting tool marks being present. Rivet shanks are never bent, soft brass rivets being handled with the same facility as those of steel.

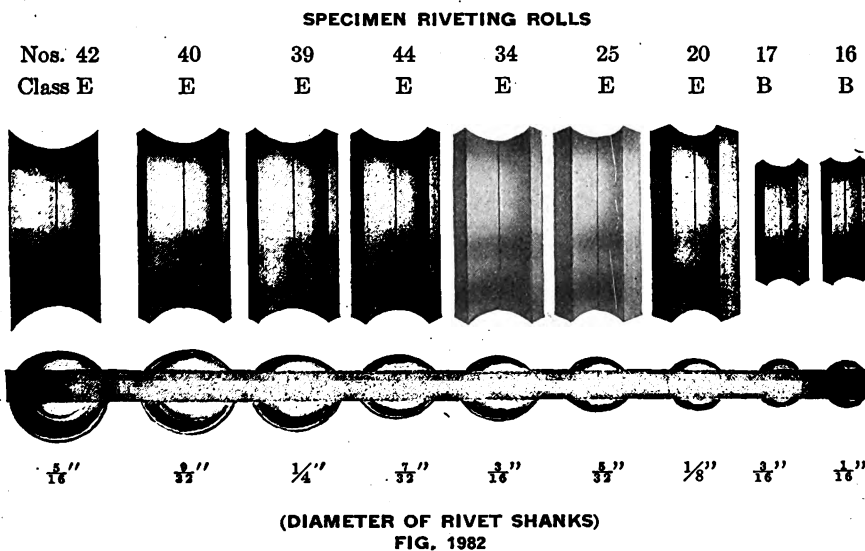
The facility with which an article can be handled alone limits the output, the actual time consumed for the rolls to swedge a head on the shank not being over one second.

Mechanically, every care is taken to make these machines perfect. The spindles are ground to fit and run in phosphor bronze bearings, being also provided with ample ball thrust bearings, which are hardened and ground and will withstand the severest usage.

Each machine is shipped complete with a countershaft having self-oiling bearings, and with necessary wrenches. One roll holder fitted with one set of rolls suitable for such size rivet as customer may select, is also included with the machine.

It is well to let us know the purpose for which the machine is intended as we can often save you expense.

At a slight extra charge, we will fit machines with special fixtures, when required, for special work.

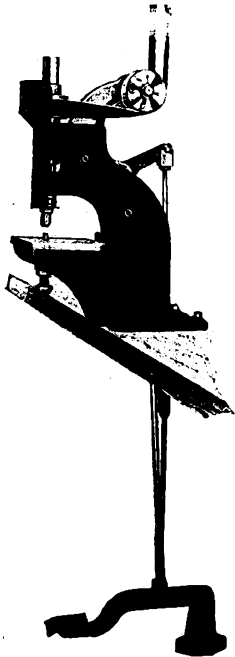


The above full size cut shows a few specimen riveting Rolls, also rivets which have been headed with the same.

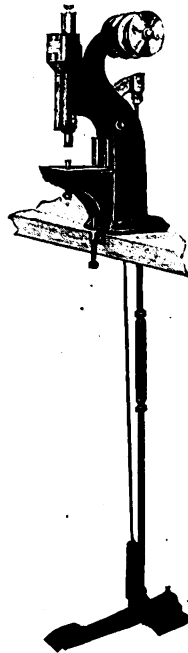
Above the rolls are numbers which designate the form or style rivet head as shown on the rivets for the respective sizes of rivet shanks as shown thereon.

Rolls different in shape from above can be furnished to produce any reasonable shaped head to meet various requirements.

GRANT ROTARY RIVET SPINNING MACHINES



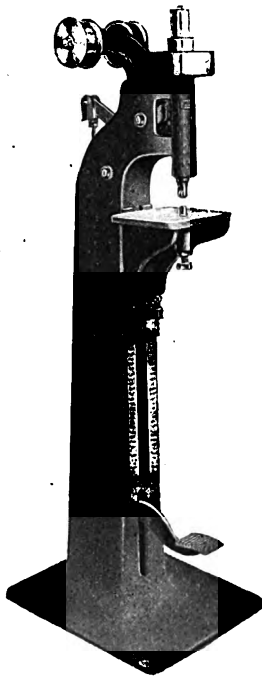
BENCH TYPE NO. 81 AND 81A
FIG. 1983



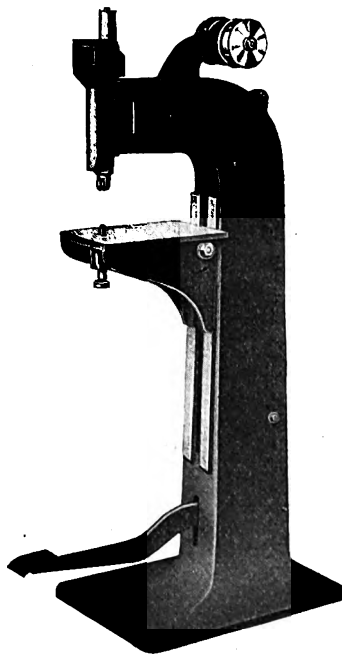
BENCH TYPE NO. 82
FIG. 1984



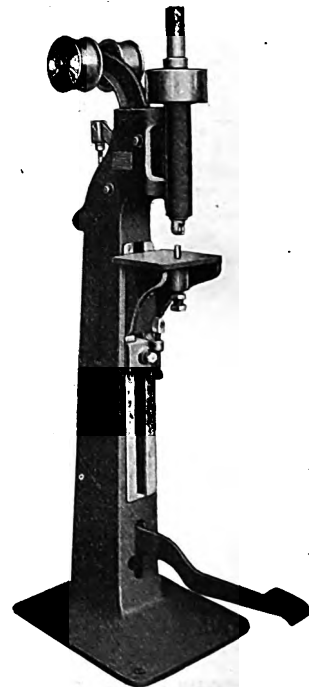
PEDESTAL TYPE NO. 80, 80A, 80B
EQUIPPED WITH HORN TABLE
FIG. 1985



PEDESTAL TYPE NO. 80, 80A, 80B
EQUIPPED WITH FLAT TABLE
FIG. 1986



DEEP THROAT PEDESTAL TYPE
NO. 105, 106 and 107
FIG. 1987



PEDESTAL TYPE NO. 120
FIG. 1988

GRANT ROTARY RIVET SPINNING MACHINES

DIMENSIONS AND CAPACITIES

	BENCH TYPE		PEDESTAL TYPE		
Number	81 & 81A	82	80, 80A & 80B	105, 106 & 107	120
Capacity, inch.....	$\frac{1}{4}$; $\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$; $\frac{1}{4}$; $\frac{1}{8}$	$\frac{1}{8}$; $\frac{1}{4}$; $\frac{1}{8}$	$\frac{3}{8}$
Distance from column to spindle, inch.....	$5\frac{5}{8}$	$2\frac{3}{4}$	$5\frac{5}{8}$	$11\frac{1}{2}$	$5\frac{5}{8}$
Table drops from spinning rolls, inch.....	3	$3\frac{3}{8}$	22	23	22
Height from floor to spinning tools.....			41	42	41
Height of machine, inches.....	26	16	58	60	64
Bench Space, inches.....	8x10	5x5			
Floor Space.....			17x21	18x35	18x35
Width of driving belt, inch.....	$1\frac{1}{2}$	1	$1\frac{1}{2}$	$1\frac{1}{2}$	$2\frac{1}{2}$
Diameter of spindle pulley, inches.....	$4\frac{1}{2}$; $3\frac{1}{2}$	2	6; $4\frac{1}{2}$; $3\frac{1}{2}$	$3\frac{1}{2}$; $4\frac{1}{2}$; 6	6
Spindle Speed, R. P. M.....	1750 to 2000	2500	1500; 1750; 2000	2000; 1750; 1500	1500
Dimensions of table, inches.....	8x8	4x4	8x8	8x14	8x8
Diam. countershaft driving pulley, inches.....	10	10	10	10	12x3
Dimensions of tight & loose pulleys, inches.....	6x2	6x2	6x2	6x2	6x3
Weight of machine without countershaft, lbs.....	140	30	300	470	333
Weight of machine boxed, lbs.....	175	45	375	550	500
Weight of countershaft skidded, lbs.....	45	45	40	50	70

Prices on application.

Nos. 80, 80A and 80B: On work such as automobile lamps a horn table instead of a flat table is furnished, the rivet being inserted from the inside, and a neat uniform head spun outside on the rivet shank. Both tables can be furnished when desired.

Nos. 105, 106, 107 & 120: This Type machine can be furnished with Horizontal Type Motor. When ordering Motor Driven machine if direct current give voltage; if alternating current give voltage, cycles and phase

GRANT ROTARY VIBRATING RIVETERS

These machines have been designed for operating in close corners, and in places where it is impossible to be reached by the regular Grant Noiseless Rotary Roll Riveting Machines.

DIMENSIONS AND CAPACITIES

Number	1	2
Capacity, inch.....	$\frac{1}{8}$	$\frac{1}{4}$
Distance from column to spindle, inch.....	$3\frac{1}{2}$	$5\frac{5}{8}$
Distance from top of table to end of spindle, inches.....	4	..
Table drops from riveting spindle, inch.....	..	22
Height of machine, in.....	16	52
Bench Space, inches.....	$12 \times 9\frac{1}{2}$	..
Floor Space, inches.....	..	17×21
Driving Belt, inches.....	$\frac{1}{8}$ Round	1
Diam. of Driving Pulley, inches.....	$2\frac{3}{4}$	4
Speed of Driving Pulley, R. P. M....	3000	2000
Dimensions of table, inches.....	$3 \times 4\frac{1}{2}$	8x8
Diam. of Countershaft Driving Pulley, inch..	10	10
Diam. of Tight and Loose Pulley, in..	$1\frac{1}{2} \times 4$	6x2
Weight of machine without countershaft, lbs.....	65	300
Weight of machine boxed, lbs.....	100	375
Weight of countershaft, lbs.....	40	40

Prices on application.

The No. 2 Machine can be fitted with horn table if desired.

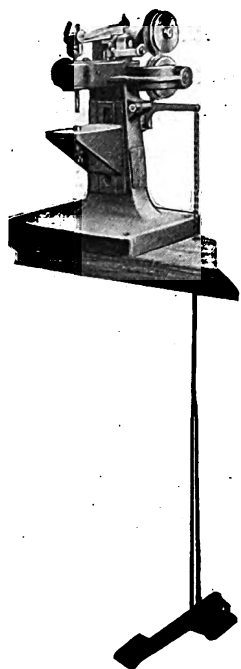


FIG. 1989

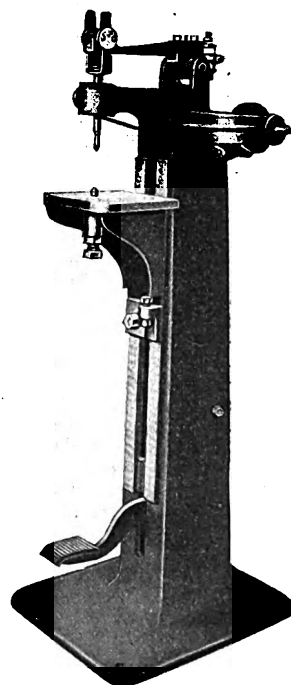


FIG. 1990

BLAKE INSULATED STAPLES

FOR TWISTED PAIR AND SINGLE WIRES.

Put up in Packages of 100

No 1—Length, $\frac{1}{4}$ -inch, for Hardwood

No 3—Length, $\frac{3}{4}$ -inch, for General Use

Nos 1 & 3

Single Packages (100 Staples), each.....\$.8

Package (of 1000), each.....2.0



FIG. 1965



FIG. 1966

FOR TWISTED 3-WIRE AND EXTRA HEAVY PAIR WIRE.

No 5—Length $\frac{5}{8}$ -inch, For Hardwood

No 6—Length $\frac{7}{8}$ -inch, For General Use

Nos 5 & 6

Single Packages (100 Staples), each.....\$.35

Package (of 1000), each.....3.20



FIG. 1967



FIG. 1968

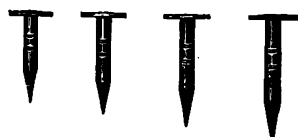


FIG. 1970

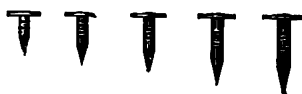


FIG. 1971

WIRE CARPET TACKS

STEEL WIRE, BLUED, CHECKERED HEAD

PRICE PER HUNDRED POUNDS

Size Nos	3	4	6	8	10	12
Length, inches.....	$\frac{3}{8}$	$\frac{7}{8}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{5}{8}$	$\frac{11}{8}$
$\frac{1}{8}$ lb. papers, price per 100 lbs.....	\$22.00	\$20.50	\$19.50	\$18.50	\$18.00	\$17.50
1, 5 and 10 lb. pkgs., price per 100 lbs....	17.00	15.50	14.50	13.50	13.00	12.50

$\frac{1}{8}$ lb. papers—One dozen in a package.

For 25 lb. boxes deduct \$1.00 per 100 lbs. from 1, 5 and 10 lb. list.

STANDARD STEEL WIRE NAILS

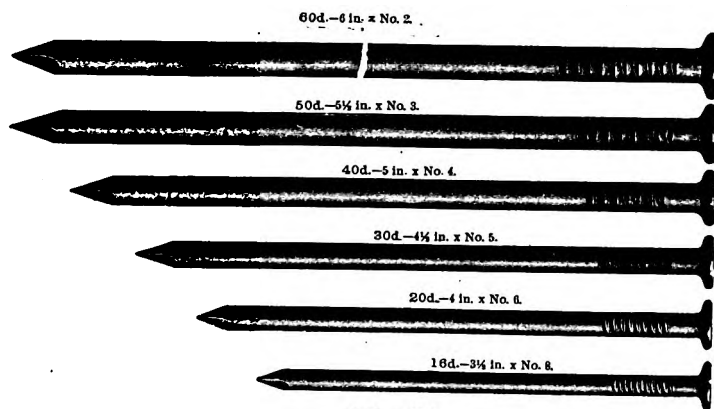


FIG. 1974

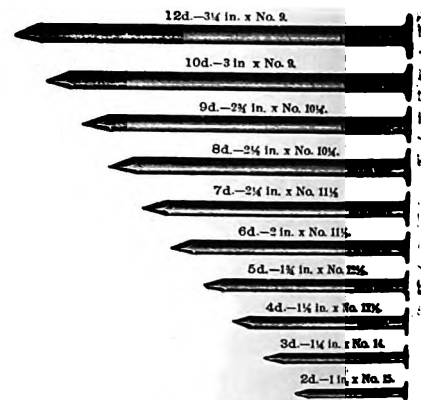


FIG. 1975

COMMON NAILS—BASE PRICE PER KEG

Size, Penny.....	2d	3d	4d	5d	6d	7d	8d	9d	10d	12d	16d	20d	30d	40d	50d	60d
Length, inches.....	1	1 $\frac{1}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	2	2 $\frac{1}{4}$	2 $\frac{1}{2}$	2 $\frac{3}{4}$	3	3 $\frac{1}{4}$	3 $\frac{1}{2}$	4	4 $\frac{1}{2}$	5	5 $\frac{1}{2}$	6
Gauge, No.....	15	14	12 $\frac{1}{2}$	12 $\frac{1}{2}$	11 $\frac{1}{2}$	11 $\frac{1}{2}$	10 $\frac{1}{4}$	10 $\frac{1}{4}$	9	9	8	6	5	4	3	2
Approx. No. to Lb.....	876	568	316	271	181	161	106	96	69	63	49	31	24	18	14	11
Polished, Advance over Base.....	\$.70	\$.45	\$.30	\$.30	\$.20	\$.20	\$.10	\$.10	\$.05	\$.05	\$.05	Base	Base	Base	Base	Base
Galvanized, Advance over Base.....		1.55	1.40	1.40	1.30	1.30	1.20		1.15			\$1.10	\$1.10	\$1.10		\$1.1

DRIFT PINS

BARREL SHAPED

Average length about 7 inches.

Size of pins, inches	$\frac{1}{8}$	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{3}{4}$	$\frac{1}{2}$	1 $\frac{1}{2}$
Rivet size, inches	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{5}{8}$	$\frac{3}{4}$	$\frac{7}{8}$	1
Weight, ounces	8	8	12	14	16	20
Price, each.....	\$.30	.32	.34	.42	.44	.48



FIG. 1976

CAMPBELL HAMMERLOCK SELF-SPREADING STEEL COTTER PINS

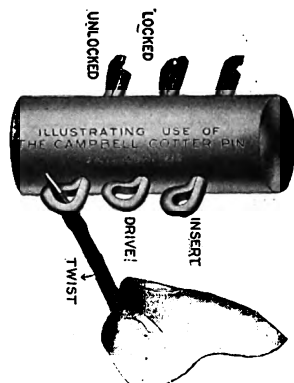


FIG. 1979

LIST PRICE PER THOUSAND
Outside Figures give Number of
Washburn & Moen Standard Wire Gauge

Size [Length Measured Under the Head]	Price per 1000	Quantity in Packages	Approximate Weight per 1000 Lbs. Oz.
16	$\frac{1}{16} \times \frac{3}{8}$ \$3.50	1000	6
	" $\frac{1}{16} \times \frac{1}{2}$ 3.50	"	7
	" $\frac{1}{16} \times \frac{5}{8}$ 3.50	"	8
	" $\frac{1}{16} \times \frac{3}{4}$ 4.15	"	10
	" $\frac{1}{16} \times \frac{7}{8}$ 4.15	"	11
	" $\frac{1}{16} \times 1$ 4.80	"	13
	" $\frac{1}{16} \times 1\frac{1}{4}$ 4.80	"	14
	" $\frac{1}{16} \times 1\frac{1}{2}$ 5.45	"	1 — 2
	" $\frac{1}{16} \times 1\frac{3}{4}$ 6.10	"	1 — 5
	" $\frac{1}{16} \times 2$ 6.10	"	12
14½	$\frac{3}{16} \times \frac{3}{8}$ 3.50	"	13
	" $\frac{3}{16} \times \frac{1}{2}$ 3.50	"	15
	" $\frac{3}{16} \times \frac{5}{8}$ 4.15	"	1 — 1
	" $\frac{3}{16} \times \frac{3}{4}$ 4.15	"	1 — 3
	" $\frac{3}{16} \times \frac{7}{8}$ 4.80	"	1 — 5
	" $\frac{3}{16} \times 1$ 4.80	"	1 — 8
	" $\frac{3}{16} \times 1\frac{1}{4}$ 5.45	"	1 — 12
	" $\frac{3}{16} \times 1\frac{1}{2}$ 6.10	"	2 — 1
	" $\frac{3}{16} \times 1\frac{3}{4}$ 6.10	"	1 — 5
	" $\frac{3}{16} \times 2$ 7.40	"	1 — 9
13	$\frac{7}{16} \times \frac{3}{8}$ 4.15	"	1 — 13
	" $\frac{7}{16} \times \frac{1}{2}$ 4.15	"	2 — 1
	" $\frac{7}{16} \times \frac{5}{8}$ 4.80	"	2 — 5
	" $\frac{7}{16} \times \frac{3}{4}$ 5.45	"	2 — 13
	" $\frac{7}{16} \times \frac{7}{8}$ 6.10	"	3 — 5
	" $\frac{7}{16} \times 1$ 6.75	"	3 — 13
	" $\frac{7}{16} \times 1\frac{1}{4}$ 7.40	"	4 — 5
	" $\frac{7}{16} \times 1\frac{1}{2}$ 4.00	"	1 — 15
	" $\frac{7}{16} \times 1\frac{3}{4}$ 4.75	"	2 — 4
	" $\frac{7}{16} \times 2$ 4.75	"	2 — 9
12	" $\frac{1}{2} \times \frac{3}{8}$ 5.50	"	2 — 14
	" $\frac{1}{2} \times \frac{1}{2}$ 5.50	"	3 — 3
	" $\frac{1}{2} \times \frac{5}{8}$ 6.25	"	3 — 14
	" $\frac{1}{2} \times \frac{3}{4}$ 7.00	"	4 — 8
	" $\frac{1}{2} \times \frac{7}{8}$ 7.75	"	5 — 3
	" $\frac{1}{2} \times 1$ 8.50	"	5 — 13
	" $\frac{1}{2} \times 1\frac{1}{4}$ 5.00	1000	2 — 8
	" $\frac{1}{2} \times 1\frac{1}{2}$ 5.85	"	2 — 14
	" $\frac{1}{2} \times 1\frac{3}{4}$ 5.85	"	3 — 4
	" $\frac{1}{2} \times 2$ 6.70	"	3 — 10
11	" $\frac{5}{8} \times \frac{3}{8}$ 6.70	"	4 — 0
	" $\frac{5}{8} \times \frac{1}{2}$ 7.55	"	4 — 12
	" $\frac{5}{8} \times \frac{5}{8}$ 8.40	"	5 — 8
	" $\frac{5}{8} \times \frac{3}{4}$ 9.25	"	6 — 4
	" $\frac{5}{8} \times \frac{7}{8}$ 10.10	"	7 — 0
	" $\frac{5}{8} \times 1$ 10.95	500	7 — 12
	" $\frac{5}{8} \times 1\frac{1}{4}$ 11.80	"	9 — 8
	" $\frac{5}{8} \times 1\frac{1}{2}$ 5.00	"	2 — 8
	" $\frac{5}{8} \times 1\frac{3}{4}$ 5.85	"	2 — 14
	" $\frac{5}{8} \times 2$ 6.70	"	3 — 10



PATD. MARCH 1912

FIG. 1980

Easiest to Insert.—As the points are close together and well tapered. Pliers unnecessary.

Easiest to Lock.—Merely drive on the head until the points are of equal length. This will partially flatten the eye and will force the shorter or straight branch forward so that its end will ride up over the upturned point of the other limb, thus automatically spreading as well as locking the pin rigidly in place.

Easiest to Remove.—Use point of screw driver, the tang of a file, a key, or any thin tool, in the eye, twisting in the direction indicated by arrow to return short shank to its original position. Then remove with fingers.

Size [Length Measured Under the Head]	Price per 1000	Quantity in Packages	Approximate Weight per 1000 Lbs. Oz.
10	$\frac{1}{8} \times \frac{3}{4}$ \$ 7.00	1000	4 — 10
	" $\frac{1}{8} \times 1$ 8.00	"	5 — 8
	" $\frac{1}{8} \times 1\frac{1}{4}$ 9.00	"	6 — 7
	" $\frac{1}{8} \times 1\frac{1}{2}$ 10.00	"	7 — 5
	" $\frac{1}{8} \times 1\frac{3}{4}$ 11.00	"	8 — 3
	" $\frac{1}{8} \times 2$ 12.00	500	9 — 2
	" $\frac{1}{8} \times 2\frac{1}{4}$ 13.00	"	10 — 0
	" $\frac{1}{8} \times 2\frac{1}{2}$ 14.00	"	10 — 14
	" $\frac{1}{8} \times 2\frac{3}{4}$ 8.15	"	5 — 2
	" $\frac{1}{8} \times 3$ 9.30	"	6 — 5
9	" $\frac{1}{8} \times 1\frac{1}{4}$ 10.45	"	7 — 8
	" $\frac{1}{8} \times 1\frac{1}{2}$ 11.60	"	8 — 11
	" $\frac{1}{8} \times 1\frac{3}{4}$ 12.75	"	9 — 14
	" $\frac{1}{8} \times 2$ 13.90	"	11 — 2
	" $\frac{1}{8} \times 2\frac{1}{4}$ 15.05	"	12 — 5
	" $\frac{1}{8} \times 2\frac{1}{2}$ 16.20	"	13 — 8
	" $\frac{1}{8} \times 2\frac{3}{4}$ 9.30	"	6 — 11
	" $\frac{1}{8} \times 3$ 10.60	"	8 — 0
	" $\frac{1}{8} \times 1\frac{1}{4}$ 11.90	"	9 — 6
	" $\frac{1}{8} \times 1\frac{1}{2}$ 13.20	"	10 — 11
8	" $\frac{1}{8} \times 1\frac{3}{4}$ 14.50	"	12 — 2
	" $\frac{1}{8} \times 2$ 15.80	"	13 — 8
	" $\frac{1}{8} \times 2\frac{1}{4}$ 17.10	"	14 — 14
	" $\frac{1}{8} \times 2\frac{1}{2}$ 18.40	"	16 — 3
	" $\frac{1}{8} \times 2\frac{3}{4}$ 11.10	"	8 — 3
	" $\frac{1}{8} \times 3$ 12.80	"	10 — 0
	" $\frac{1}{8} \times 1\frac{1}{4}$ 14.50	"	11 — 13
	" $\frac{1}{8} \times 1\frac{1}{2}$ 16.20	"	13 — 10
	" $\frac{1}{8} \times 1\frac{3}{4}$ 17.90	"	15 — 7
	" $\frac{1}{8} \times 2$ 19.60	"	17 — 3
7	" $\frac{1}{8} \times 2\frac{1}{4}$ 21.30	250	19 — 0
	" $\frac{1}{8} \times 2\frac{1}{2}$ 23.00	"	20 — 13
	" $\frac{1}{8} \times 2\frac{3}{4}$ 24.70	"	22 — 10
	" $\frac{1}{8} \times 3$ 26.40	"	24 — 7
	" $\frac{1}{8} \times 1$ 14.00	500	12 — 6
	" $\frac{1}{8} \times 1\frac{1}{4}$ 16.00	"	14 — 7
	" $\frac{1}{8} \times 1\frac{1}{2}$ 18.00	"	16 — 8
	" $\frac{1}{8} \times 1\frac{3}{4}$ 20.00	250	18 — 9
	" $\frac{1}{8} \times 2$ 22.00	"	20 — 10
	" $\frac{1}{8} \times 2\frac{1}{4}$ 24.00	"	22 — 11
6	" $\frac{1}{8} \times 2\frac{1}{2}$ 26.00	"	24 — 12
	" $\frac{1}{8} \times 2\frac{3}{4}$ 28.00	"	26 — 13
	" $\frac{1}{8} \times 3$ 30.00	"	28 — 14
	" $\frac{1}{8} \times 1$ 14.00	"	12 — 6

Prices on Brass Pins quoted on request.

CAMPBELL HAMMER-LOCK SELF-SPREADING STEEL COTTER PINS

Size [Length Measured] Under the Head	Price Per 1000	Quantity in Packages	Approximate Weight per 1000 Lbs. Oz.	Size [Length Measured] Under the Head	Price Per 1000	Quantity in Packages	Approximate Weight per 1000 Lbs. Oz.
5	$\frac{1}{2}$ x 1	\$18.00	500	1	$\frac{1}{2}$ x $1\frac{1}{4}$	\$ 37.50	125
	$\frac{1}{2}$ x $1\frac{1}{4}$	20.80	"		$\frac{1}{2}$ x $1\frac{1}{2}$	42.50	"
	$\frac{1}{2}$ x $1\frac{3}{4}$	23.60	250		$\frac{1}{2}$ x $1\frac{3}{4}$	47.50	"
	$\frac{1}{2}$ x 2	26.40	"		$\frac{1}{2}$ x 2	52.50	"
	$\frac{1}{2}$ x $2\frac{1}{4}$	29.20	"		$\frac{1}{2}$ x $2\frac{1}{4}$	57.50	"
	$\frac{1}{2}$ x $2\frac{1}{2}$	32.00	"		$\frac{1}{2}$ x $2\frac{1}{2}$	62.50	"
	$\frac{1}{2}$ x $2\frac{3}{4}$	34.80	"		$\frac{1}{2}$ x $2\frac{3}{4}$	67.50	"
	$\frac{1}{2}$ x 3	37.60	"		$\frac{1}{2}$ x 3	72.50	Bulk
	$\frac{1}{2}$ x $3\frac{1}{4}$	30.40	"		$\frac{1}{2}$ x $3\frac{1}{4}$	77.50	"
	$\frac{1}{2}$ x $3\frac{1}{2}$	30.40	"		$\frac{1}{2}$ x $3\frac{1}{2}$	82.50	"
4	$\frac{1}{4}$ x 1	20.00	"	00	$\frac{1}{4}$ x $1\frac{1}{4}$	72.00	"
	$\frac{1}{4}$ x $1\frac{1}{4}$	23.50	"		$\frac{1}{4}$ x $1\frac{1}{2}$	79.20	"
	$\frac{1}{4}$ x $1\frac{3}{4}$	27.00	"		$\frac{1}{4}$ x $1\frac{3}{4}$	79.20	"
	$\frac{1}{4}$ x 2	30.50	"		$\frac{1}{4}$ x 2	86.40	"
	$\frac{1}{4}$ x $2\frac{1}{4}$	34.00	"		$\frac{1}{4}$ x $2\frac{1}{4}$	93.60	"
	$\frac{1}{4}$ x $2\frac{1}{2}$	37.50	"		$\frac{1}{4}$ x $2\frac{1}{2}$	100.80	"
	$\frac{1}{4}$ x $2\frac{3}{4}$	41.00	"		$\frac{1}{4}$ x $2\frac{3}{4}$	108.00	"
	$\frac{1}{4}$ x 3	44.50	125		$\frac{1}{4}$ x 3	115.20	"
	$\frac{1}{4}$ x $3\frac{1}{4}$	48.00	"		$\frac{1}{4}$ x $3\frac{1}{4}$	122.40	"
	$\frac{1}{4}$ x $3\frac{1}{2}$	51.50	"		$\frac{1}{4}$ x $3\frac{1}{2}$	129.60	"
	$\frac{1}{4}$ x $3\frac{3}{4}$	55.00	"		$\frac{1}{4}$ x 4	136.80	"
	$\frac{1}{4}$ x 4	58.50	"			144.00	"
		62.00	"				

Prices on Brass Pins quoted on request.

SPRING COTTERS

BRIGHT STEEL, SHARP POINTED

MADE FROM BEST QUALITY HALF
ROUND SPRING WIRE

FIG. 1978

LIST PRICE PER THOUSAND

Gauge No.	18	16	14	13	12	11	10	9	8	7	6	5	4	1	—	—	—	—
Dim. In.	$\frac{3}{16}$	$\frac{1}{8}$	$\frac{5}{16}$	$\frac{3}{8}$	$\frac{7}{16}$	$\frac{1}{2}$	$\frac{5}{8}$	$\frac{3}{4}$	$\frac{7}{8}$	$1\frac{1}{8}$	$1\frac{1}{4}$	$1\frac{1}{2}$	$\frac{1}{4}$	$\frac{1}{16}$	$\frac{3}{8}$	$\frac{1}{16}$	$\frac{1}{2}$	$\frac{5}{8}$
Length																		
$\frac{1}{2}$	\$3.50	\$3.50	\$3.50	\$3.50	\$4.00	\$ 5.00	\$6.00	\$ 7.00	\$ 8.00									
$\frac{3}{4}$	4.15	4.15	4.15	4.15	4.75	5.85	7.00	8.15	9.30	\$11.10	\$12.00							
$1\frac{1}{4}$	4.80	4.80	4.80	4.80	5.50	6.70	8.00	9.30	10.60	12.80	14.00	\$18.00	\$20.00	\$32.50				
$1\frac{1}{2}$	5.45	5.45	5.45	5.45	6.25	7.55	9.00	10.45	11.90	14.50	16.00	20.80	23.50	37.50				
$1\frac{3}{4}$	6.10	6.10	6.10	6.10	7.00	8.40	10.00	11.60	13.20	16.20	18.00	23.60	27.00	42.50	\$ 72.00			
2	6.75	6.75	6.75	6.75	7.75	9.25	11.00	12.75	14.50	17.90	20.00	26.40	30.50	47.50	79.20	\$108.00		
$2\frac{1}{4}$	7.40	7.40	7.40	7.40	8.50	10.10	12.00	13.90	15.80	19.60	22.00	29.20	34.00	52.50	86.40	119.50	\$148.50	
$2\frac{1}{2}$						10.95	13.00	15.05	17.10	21.30	24.00	32.00	37.50	57.50	93.60	131.00	163.50	
$2\frac{3}{4}$						11.80	14.00	16.20	18.40	23.00	26.00	34.80	41.00	62.50	100.80	142.50	178.50	
3										24.70	28.00	37.60	44.50	67.50	108.00	154.00	193.50	
$3\frac{1}{4}$										26.40	30.00	40.40	48.00	72.50	115.20	165.50	208.50	\$384.00
$3\frac{1}{2}$													51.50	77.50	122.40	177.00	223.50	404.00
$3\frac{3}{4}$													55.00	82.50	129.60	188.50	238.50	424.00
4													58.50	87.50	136.80	200.00	253.50	444.00
$4\frac{1}{4}$													62.00	92.50	144.00	211.50	268.50	464.00
$4\frac{1}{2}$																257.50	328.50	544.00
$4\frac{3}{4}$																	388.50	644.00

For length, measure from under the eye to the point.

COTTER PIN TOOLFIG. 1979 $\frac{1}{2}$ Made from the best grade of tool steel. One end pointed
for removing pin, the other end flat for spreading the ends.
Polished ends.

No. 1899. $\frac{1}{4}$ inch square, 7 inches long, price each \$0.25
 No. 1900. $\frac{1}{2}$ inch square, 7 inches long, price " .25
 No. 1901. $\frac{3}{8}$ inch square, 7 inches long, price " 25

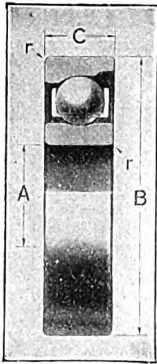


FIG. 5037

"NORMA" BALL BEARINGS

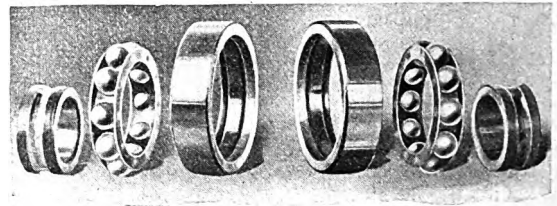


FIG. 1991

"NORMA"—SPECIAL SMALL ANNULAR BALL BEARINGS

For small Motors, Ventilators, Ignition Apparatus, Magnetos, small Dynamos, Generators, Speedometers and all small light-running machines requiring high speed.

DIMENSIONS AND PRICES

Type	A		B		C		R		Balls		Price Each
	Inside Diameter		Outside Diameter		Width		Radius		No.	Diam.	
	M/M	Inch	M/M	Inch	M/M	Inch	M/M	Inch			
E 8-6	6	0.2362	24	0.9449	7	0.2756	0.3	0.011	8	$\frac{3}{16}$ "	\$2.60
E 8-7	7	0.2756	24	0.9449	7	0.2756	0.3	0.011	8	$\frac{3}{16}$ "	2.60
E 8	8	0.3150	24	0.9449	7	0.2756	0.3	0.011	8	$\frac{3}{16}$ "	2.60
E 9	9	0.3543	28	1.1023	8	0.3150	0.3	0.011	8	$\frac{7}{32}$ "	2.60
E 10	10	0.3937	28	1.1023	8	0.3150	0.3	0.011	8	$\frac{7}{32}$ "	2.60
E 11	11	0.4331	32	1.2598	7	0.2756	0.4	0.015	10	$\frac{3}{16}$ "	2.60
E 12	12	0.4724	32	1.2598	7	0.2756	0.4	0.015	10	$\frac{3}{16}$ "	2.60
E 13	13	0.5118	30	1.1811	7	0.2756	0.3	0.011	10	$\frac{3}{16}$ "	2.60
E 14	14	0.5512	35	1.3779	8	0.3150	0.5	0.019	11	$\frac{7}{32}$ "	3.00
E 15	15	0.5905	35	1.3779	8	0.3150	0.5	0.019	11	$\frac{7}{32}$ "	3.00
SP. E 15	..	0.5625	35	1.3779	8	0.3150	0.5	0.019	11	$\frac{7}{32}$ "	3.75
B 15	15	0.5905	40	1.5748	10	0.3937	1.0	0.039	11	$\frac{1}{4}$ "	4.00
E 16	16	0.6299	38	1.4961	10	0.3937	0.5	0.019	10	$\frac{1}{4}$ "	3.30
E 17	17	0.6693	44	1.7323	11	0.4331	1.0	0.039	11	$\frac{1}{4}$ "	3.75
E 17-10	17	0.6693	44	1.7323	10	0.3937	1.0	0.039	11	$\frac{1}{4}$ "	3.75

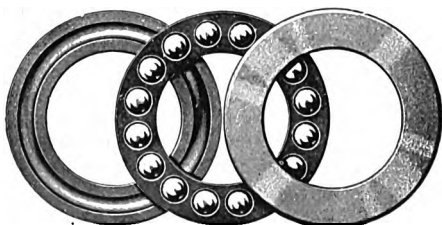
LIGHT SERVICE SERIES

L 17	17	0.6693	40	1.5748	10	0.3937	1	0.039	11	$\frac{1}{4}$ "	\$4.00
L 20	20	0.7874	47	1.8504	14	0.5512	1	0.039	11	$\frac{5}{16}$ "	4.75
L 25	25	0.9842	52	2.0472	15	0.5905	1	0.039	12	$\frac{5}{16}$ "	5.25

MEDIUM SERVICE SERIES

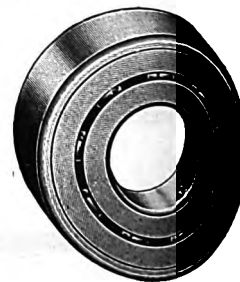
M 20	20	0.7874	52	2.0472	15	0.5905	1	0.039	10	$\frac{3}{8}$ "	\$5.90
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THRUST AND DOUBLE ROW BALL BEARINGS



THRUST BEARINGS
FIG. 1992

Owing to the great number of types, sizes, and limited space, it is practically impossible to list Thrust and Double Row Ball Bearings. However, we will be pleased to give your orders for these items prompt attention. Kindly give full details of car, year model and all dimensions of bearings required with your order.



DOUBLE BALL BEARINGS
FIG. 1993

GURNEY RADIAL BALL BEARINGS

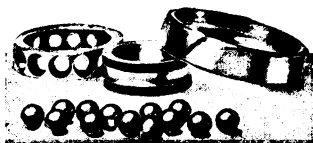


FIG. 1995

LIGHT SERIES

No. of Bearing	Bore		Outside		Width		Radius	Balls		Rated Load Pounds	R. P. M. Permissible at Rated Load	Price Each
	M. M.	Inch	M. M.	Inch	M. M.	Inch	Inch	No.	Size			
204	20	0.7874	47	1.8504	14	0.5512	$\frac{3}{16}$	13	$\frac{3}{16}$	500	1450	\$ 5.40
205	25	0.9843	52	2.0473	15	0.5906	$\frac{3}{16}$	14	$\frac{3}{16}$	550	1250	6.50
206	30	1.1811	62	2.4410	16	0.6299	$\frac{1}{8}$	15	$\frac{1}{8}$	750	1050	7.75
207	35	1.3780	72	2.8347	17	0.6693	$\frac{1}{8}$	16	$\frac{3}{8}$	1150	900	9.50
208	40	1.5748	80	3.1496	18	0.7087	$\frac{1}{8}$	16	$\frac{1}{8}$	1550	800	11.25
209	45	1.7717	85	3.3465	19	0.7480	$\frac{1}{8}$	17	$\frac{1}{8}$	1650	740	12.25
210	50	1.9685	90	3.5433	20	0.7874	$\frac{3}{16}$	18	$\frac{1}{8}$	1750	680	14.00
211	55	2.1654	100	3.9370	21	0.8268	$\frac{3}{16}$	18	$\frac{1}{2}$	2300	600	16.00
212	60	2.3622	110	4.3307	22	0.8661	$\frac{3}{16}$	17	$\frac{1}{8}$	2700	550	19.50
213	65	2.5591	120	4.7244	23	0.9055	$\frac{3}{16}$	17	$\frac{5}{8}$	3400	500	25.00
214	70	2.7559	125	4.9213	24	0.9449	$\frac{3}{16}$	18	$\frac{5}{8}$	3600	475	27.00
215	75	2.9528	130	5.1181	25	0.9843	$\frac{3}{16}$	19	$\frac{5}{8}$	3800	450	30.00
216	80	3.1496	140	5.5118	26	1.0236	$\frac{3}{16}$	19	$\frac{11}{16}$	4600	420	34.00
217	85	3.3465	150	5.9055	28	1.1024	$\frac{3}{16}$	18	$\frac{3}{4}$	5100	390	39.00
218	90	3.5433	160	6.2992	30	1.1811	$\frac{3}{16}$	18	$\frac{11}{16}$	6000	370	48.00
219	95	3.7402	170	6.6929	32	1.2598	$\frac{1}{8}$	18	$\frac{7}{8}$	7000	350	55.00
220	100	3.9370	180	7.0866	34	1.3386	$\frac{1}{8}$	17	$\frac{11}{16}$	7600	330	62.00
221	105	4.1339	190	7.4804	36	1.4173	$\frac{1}{8}$	17	1	8500	315	72.00
222	110	4.3307	200	7.8741	38	1.4961	$\frac{1}{8}$	17	$1\frac{1}{8}$	9800	300	82.00

We can also furnish the following Light Series Bearings in other makes:

200	10	.39370	30	1.18110	9	.35433	$\frac{1}{16}$	7	$\frac{1}{16}$	165	....	\$ 3.60
201	12	.47244	32	1.25984	10	.39370	$\frac{1}{16}$	7	$\frac{1}{16}$	190	....	3.75
202	15	.59055	35	1.37795	11	.43307	$\frac{1}{16}$	8	$\frac{1}{16}$	220	....	4.00
203	17	.66929	40	1.57480	12	.47244	$\frac{1}{16}$	8	$\frac{1}{4}$	300	....	4.50

MEDIUM SERIES

304	20	0.7874	52	2.0473	15	0.5906	$\frac{3}{16}$	13	$\frac{1}{8}$	650	1200	\$ 7.00
305	25	0.9843	62	2.4410	17	0.6693	$\frac{1}{8}$	13	$\frac{3}{8}$	900	1050	8.25
306	30	1.1811	72	2.8347	19	0.7480	$\frac{1}{8}$	13	$\frac{1}{8}$	1250	950	10.50
307	35	1.3780	80	3.1496	21	0.8268	$\frac{1}{8}$	13	$\frac{1}{2}$	1650	850	12.50
308	40	1.5748	90	3.5433	23	0.9055	$\frac{1}{8}$	13	$\frac{1}{8}$	2100	750	15.00
309	45	1.7717	100	3.9370	25	0.9843	$\frac{3}{16}$	13	$\frac{5}{8}$	2600	675	18.00
310	50	1.9685	110	4.3307	27	1.0630	$\frac{3}{16}$	13	$\frac{11}{16}$	3150	625	21.50
311	55	2.1654	120	4.7244	29	1.1417	$\frac{3}{16}$	13	$\frac{3}{4}$	3750	575	26.00
312	60	2.3622	130	5.1181	31	1.2205	$\frac{3}{16}$	14	$\frac{11}{16}$	4700	525	32.00
313	65	2.5591	140	5.5118	33	1.2992	$\frac{3}{16}$	14	$\frac{7}{8}$	5500	475	39.00
314	70	2.7559	150	5.9055	35	1.3780	$\frac{3}{16}$	14	$\frac{11}{16}$	6300	450	46.00
315	75	2.9528	160	6.2992	37	1.4567	$\frac{1}{8}$	14	1	7100	425	54.00
316	80	3.1496	170	6.6929	39	1.5354	$\frac{1}{8}$	14	$1\frac{1}{8}$	8000	400	65.00
317	85	3.3465	180	7.0866	41	1.6142	$\frac{1}{8}$	14	$1\frac{1}{8}$	9000	375	78.00
318	90	3.5433	190	7.4804	43	1.6929	$\frac{1}{8}$	14	$1\frac{1}{8}$	10100	350	92.00

We can also furnish the following medium Series Bearings in other makes:

300	10	.39370	35	1.37795	11	.43307	$\frac{1}{16}$	6	$\frac{1}{16}$	200	....	\$ 4.50
301	12	.47244	37	1.45699	12	.47244	$\frac{1}{16}$	7	$\frac{1}{16}$	240	....	4.75
302	15	.59055	42	1.65354	13	.51181	$\frac{1}{16}$	7	$\frac{1}{16}$	280	....	5.25
303	17	.66929	47	1.85039	14	.55118	$\frac{1}{16}$	7	$\frac{1}{8}$	375	....	6.00

GURNEY RADIAL BALL BEARINGS

HEAVY SERIES

No. of Bearing	Bore		Outside		Width		Radius	Balls		Rated Load Pounds	R. P. M. Permissible at Rated Load	Price Each
	M. M.	Inch	M. M.	Inch	M. M.	Inch	Inch	No.	Size			
404	20	0.7874	72	2.8347	19	0.7480	$\frac{1}{16}$	9	$\frac{3}{16}$	1450	1250	\$ 11.50
405	25	0.9843	80	3.1496	21	0.8268	$\frac{1}{16}$	9	$\frac{3}{16}$	1800	1075	13.00
406	30	1.1811	90	3.5433	23	0.9055	$\frac{3}{32}$	10	$\frac{1}{8}$	2400	875	16.00
407	35	1.3780	100	3.9370	25	0.9843	$\frac{3}{32}$	10	$\frac{3}{4}$	2800	775	19.00
408	40	1.5748	110	4.3307	27	1.0630	$\frac{3}{32}$	11	$\frac{1}{8}$	3700	700	22.00
409	45	1.7717	120	4.7244	29	1.1417	$\frac{3}{32}$	11	$\frac{1}{8}$	4300	650	27.00
410	50	1.9685	130	5.1181	31	1.2205	$\frac{3}{32}$	11	$\frac{1}{8}$	4950	600	33.00
411	55	2.1654	140	5.5118	33	1.2992	$\frac{3}{32}$	11	1	5600	550	39.00
412	60	2.3622	150	5.9055	35	1.3780	$\frac{3}{32}$	11	1 $\frac{1}{16}$	6300	500	47.00
413	65	2.5591	160	6.2992	37	1.4567	$\frac{3}{32}$	11	1 $\frac{1}{8}$	7100	460	60.00
414	70	2.7559	180	7.0866	42	1.6536	$\frac{3}{32}$	11	1 $\frac{1}{4}$	9700	425	80.00
415	75	2.9528	190	7.4804	45	1.7717	$\frac{1}{8}$	11	1 $\frac{3}{8}$	10600	400	95.00
416	80	3.1496	200	7.8741	48	1.8898	$\frac{1}{8}$	11	1 $\frac{7}{8}$	11600	375	110.00
417	85	3.3465	210	8.2678	52	2.0473	$\frac{1}{8}$	11	1 $\frac{1}{2}$	12600	350	130.00
418	90	3.5433	225	8.8583	54	2.1260	$\frac{1}{8}$	11	1 $\frac{5}{8}$	14800	325	150.00
419	95	3.7402	250	9.8426	55	2.1654	$\frac{1}{8}$	11	1 $\frac{3}{4}$	17200	300	200.00
420	100	3.9370	265	10.4331	60	2.3622	$\frac{1}{8}$	11	1 $\frac{7}{8}$	19800	285	250.00
421	105	4.1339	290	11.4174	65	2.5591	$\frac{1}{8}$	11	2 $\frac{1}{8}$	25400	270	320.00
422	110	4.3307	320	12.5985	70	2.7559	$\frac{1}{8}$	11	2 $\frac{1}{4}$	30000	250	390.00

We can also furnish the following heavy Series Bearings in other makes:

403	17	.66929	62	2.44094	17	.66929	$\frac{1}{16}$	7	$\frac{1}{2}$	860	\$10.00
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GURNEY RADIAL THRUST BEARINGS

In addition to the Gurney Radial Ball Bearings, we can furnish Gurney Radial Thrust Bearings, taking a thrust load of either 100%, 150% or 200% of their Radial capacity. Special catalogue giving full detail of these bearings will be furnished upon request.

STEEL BALLS

These Steel Balls are made from the very highest grade of carbon crucible steel which is manufactured from a special analysis. The greatest care is exercised in manufacturing this steel so that it will respond to the special heat-treatment which insures the ball to be of even temper. These Balls will withstand a great crushing weight. They are guaranteed to be free from flaws and the variation in each package is guaranteed not to vary more than three-ten thousandths inch over or under the variation marked on each package, making the total variation on each package not to exceed six-ten thousandths inch.

A GRADE—PRICE PER HUNDRED

Diam. Inch	Price 100	Diam. Inch	Price 100	Diam. Inch	Price 100
$\frac{1}{16}$	\$.40	$\frac{1}{8}$	\$ 3.00	1 $\frac{3}{4}$	\$ 90.00
$\frac{3}{32}$	.30	$\frac{3}{16}$	9.60	1 $\frac{7}{8}$	110.00
$\frac{1}{4}$	.30	$\frac{1}{2}$	11.00	2	140.00
$\frac{5}{16}$	.36	$\frac{3}{4}$	13.00	2 $\frac{1}{8}$	170.00
$\frac{3}{8}$	.40	$\frac{1}{2}$	16.00	2 $\frac{1}{4}$	200.00
$\frac{7}{16}$	.48	1	19.00	2 $\frac{3}{8}$	240.00
$\frac{1}{2}$	.60	1 $\frac{1}{16}$	21.00	2 $\frac{1}{2}$	280.00
$\frac{9}{16}$	.90	1 $\frac{1}{8}$	24.00	2 $\frac{5}{8}$	340.00
$\frac{5}{8}$	1.20	1 $\frac{3}{8}$	27.00	2 $\frac{3}{4}$	400.00
$\frac{11}{16}$	1.60	1 $\frac{1}{2}$	31.00	2 $\frac{7}{8}$	480.00
$\frac{3}{4}$	2.00	1 $\frac{5}{8}$	35.00	3	560.00
$\frac{15}{16}$	2.80	1 $\frac{3}{4}$	42.00	3 $\frac{1}{4}$	650.00
1	4.00	1 $\frac{7}{8}$	50.00	3 $\frac{1}{2}$	750.00
1 $\frac{1}{8}$	5.60	1 $\frac{1}{2}$	58.00	3 $\frac{3}{4}$	850.00
1 $\frac{1}{4}$	6.80	1 $\frac{3}{4}$	74.00	4	1000.00



FIG. 1996

VALVE STEM FORGINGS, ROD AND YOKE ENDS

VALVE STEM FORGINGS



VALVE STEM—FIG. 5169

UNFINISHED—WELDLESS

These are regularly furnished from a fine grade of mild steel, but can be made from nickel steel, or other materials when required, in reasonable quantities.

They are subjected to a special heat treatment or refining process after forging which increases their strength and toughness and reduces the liability of breakage. Dimensions show sizes of unfinished forgings. Special Valve Stems to order.

Send for blue prints before ordering as designs are not uniform; we cannot accept responsibility otherwise.

Prices furnished upon request on learning quantity required. Dies are available for additional forms; furnished to order in minimum lots of 100 from either carbon or alloy steel.

Type and Number	Head			Stem		Lug on Head		Price	Type and Number	Head			Stem		Lug on Head		Price
	Large Diam.	Small Diam.	Thick-ness	Diam.	Length	Diam.	Length			Large Diam.	Small Diam.	Thick-ness	Diam.	Length	Diam.	Length	
A30	1 1/4	1 1/4	3/4	1 1/4	7 1/2	1 1/4	1 1/4	\$0.46	B40	2 3/4	2 3/4	1 1/4	1 1/4	9	1 1/4	1 1/4	\$1.17
A40	2 1/4	2 1/4	1 1/4	2 1/4	8 1/2	2 1/4	2 1/4	.65	C45	2 1/4	2 1/4	1 1/4	1 1/4	8 1/2	1 1/4	1 1/4	.78
A80	2 1/4	2 1/4	1 1/4	2 1/4	9	2 1/4	2 1/4	1.30	E30	1 1/4	1 1/4	1 1/4	1 1/4	7 1/2	1 1/4	1 1/4	.39
B12	1 1/4	1 1/4	1 1/4	1 1/4	7 1/2	1 1/4	1 1/4	.46	E35	1 1/4	1 1/4	1 1/4	1 1/4	7 1/2	1 1/4	1 1/4	.39
B20	2 1/4	2 1/4	1 1/4	2 1/4	8 1/2	2 1/4	2 1/4	.65	E37	2 1/4	2 1/4	1 1/4	2 1/4	8 1/2	2 1/4	2 1/4	.59
B30	2 1/4	2 1/4	1 1/4	2 1/4	8 1/2	2 1/4	2 1/4	.72	E38	2 1/4	2 1/4	1 1/4	2 1/4	8 1/2	2 1/4	2 1/4	.72

ROD ENDS

UNFINISHED

These rod or stub ends are drop-forged from mild steel which welds easily. They may be used separately or in connection with yoke ends Fig. 5171

Prices will be given for special forms on receipt of models or drawings and specifications stating quantity required. Dimensions show sizes of unfinished forgings.

*Can be furnished longer if desired. 1 largest diameter head, 1 inch.
†Head off-set from center of shank 3/4 inch. 2 largest diameter head, 1 1/4 inch.
‡1 1/4-inch hole in head. 3 largest diameter head, 1 1/4 inch.



ROD END—FIG. 5170

Number	Shank		Head		Price		Number	Shank		Head		Price	
	Diam.	Length under Head	Diam.	Thick-ness	Standard Rod Ends	Extra Length per inch or Less		Diam.	Length under Head	Diam.	Thick-ness	Standard Rod Ends	Extra Length per inch or Less
0B	1 1/4	4 1/2	3/4	1 1/4	\$0.17	.....	6A	1 1/4	2	1 1/4	1 1/4	\$0.13	.....
1B	1 1/4	2 1/2	3/4	1 1/4	.16	.....	6B	1 1/4	1	1 1/4	1 1/4	.31	.....
1C	1 1/4	*5	3/4	1 1/4	.18	\$0.03	6C	1 1/4	2 1/2	1 1/4	1 1/4	.27	.....
1D	1 1/4	2 1/2	3/4	1 1/4	.12	.....	6 1/2 A	1 1/4	4 1/2	1 1/4	1 1/4	.36	.....
1 1/2 A	1 1/4	*5	3/4	1 1/4	.28	.03	7A	1 1/4	*2 1/2	1 1/4	1 1/4	.16	.....
2A	1 1/4	*3 3/4	3/4	1 1/4	.19	.03	7B	1 1/4	*4 1/2	1 1/4	1 1/4	.28	.....
2B	1 1/4	3 1/2	3/4	1 1/4	.09	.....	7C	1 1/4	1 1/2	1 1/4	1 1/4	.35	.....
2C	1 1/4	5 1/2	3/4	1 1/4	.17	.....	7D	1 1/4	*7 1/2	1 1/4	1 1/4	.52	\$0.08
2D	1 1/4	1 1/2	3/4	1 1/4	.10	.....	7E	1 1/4	*5 1/2	1 1/4	1 1/4	.44	.08
3A	1 1/4	*2	3/4	1 1/4	.10	.03	7F	1 1/4	*4 1/2	1 1/4	1 1/4	.43	.08
3B	1 1/4	*3 3/4	3/4	1 1/4	.36	.04	7G	1 1/4	2 1/2	1 1/4	1 1/4	.30	.....
3C	1 1/4	*3 1/2	3/4	1 1/4	.10	.04	7H	1 1/4	2 1/2	1 1/4	1 1/4	.26	.....
3D	1 1/4	*3 1/2	3/4	1 1/4	.19	.04	9A	1 1/4	*3 1/2	1 1/4	1 1/4	.46	.08
3E	1 1/4	3 1/2	3/4	1 1/4	.18	.....	9B	1 1/4	*4	1 1/4	1 1/4	.37	.08
3F	1 1/4	1 1/2	3/4	1 1/4	.08	.....	9C	1 1/4	*4 3/4	1 1/4	1 1/4	.37	.08
3G	1 1/4	1 1/2	3/4	1 1/4	.09	.....	9D	1 1/4	3 1/2	1 1/4	1 1/4	.24	.....
3H	1 1/4	1 1/2	3/4	1 1/4	.10	.....	11A	1 1/4	*3 1/2	1 1/4	1 1/4	.46	.10
3J	1 1/4	3 1/2	3/4	1 1/4	.14	.....	11B	1 1/4	*4	1 1/4	1 1/4	.61	.10
4B	1 1/4	*4 1/2	3/4	1 1/4	.19	.04	11C	1 1/4	4 1/2	1 1/4	1 1/4	.37	.....
4C	1 1/4	*3 1/2	3/4	1 1/4	.31	.04	11D	1 1/4	4 1/2	1 1/4	1 1/4	.55	.10
4D	1 1/4	*2 1/2	3/4	1 1/4	.21	.04	113A	1 1/4	*6	2 1/2	1 1/4	2.46	.12
4E	1 1/4	1 1/2	3/4	1 1/4	.19	.....	13B	1 1/4	*3 1/2	1 1/4	1 1/4	.72	.12
5A	1 1/4	*4 3/4	3/4	1 1/4	.17	.06	13C	1 1/4	3 1/2	1 1/4	1 1/4	.63	.....
15B	1 1/4	2 1/2	3/4	1 1/4	.21	.....	14A	1 1/4	*5 1/2	2 1/2	1 1/4	.60	.12
5C	1 1/4	3 1/2	3/4	1 1/4	.14	.....	15A	1 1/4	*5	1 1/4	1 1/4	.92	.14
5D	1 1/4	*2 1/2	3/4	1 1/4	.19	.06	15B	1 1/4	*6	2 1/2	1 1/4	1.51	.14
5E	1 1/4	2 1/2	3/4	1 1/4	.12	.....	17A	1 1/4	*6	2 1/2	1 1/4	1.60	.16
5F	1 1/4	2 1/2	3/4	1 1/4	.14	.....	19A	1 1/4	7 1/4	2 1/2	1 1/4	1.72	.....
5G	1 1/4	*12	3/4	1 1/4	.72	.06							

YOKE ENDS

UNFINISHED

These are designed for use with rod ends Fig. 5170 and are drop-forged from mild steel which welds easily. They are furnished regularly with the slots milled 1/4 inch narrower than the thickness of heads of corresponding rod ends, but they can be supplied to order with heads solid or with openings milled to other standard sizes stated in table.

Prices will be given for special forms on receipt of models or drawings and specifications stating quantity required.

Forgings with milled slot will be sent unless differently specified; dimensions otherwise are of unfinished forgings. Shanks can be furnished longer if desired.



YOKE END—FIG. 5171

Number	For Use with Rod End Number	Shank		Head		Price		Extra Length per inch or less
		Diam.	Standard Length under Head	Length	Thickness	Width Milled Slot	Blank Without Slot	
102A	2A	1 1/4	2 1/4	1 1/4	1 1/4	1 1/4	\$0.20	\$0.03
103A	3A	1 1/4	2 1/4	1 1/4	1 1/4	1 1/4	.27	.38
104A	4A	1 1/4	3 1/4	1 1/4	1 1/4	1 1/4	.16	.27
105A	5A	1 1/4	3 1/4	1 1/4	1 1/4	1 1/4	.26	.37
106A	6A	1 1/4	3 1/4	1 1/4	1 1/4	1 1/4	.41	.55
107B	7B	1 1/4	3 1/4	1 1/4	1 1/4	1 1/4	.40	.52
108A	9A	1 1/4	3 1/4	2 1/4	1 1/4	1 1/4	.65	.86
114A	14A	1 1/4	4 1/4	2 1/4	1 1/4	1 1/4	1.44	2.00

PHOSPHOR AND PLASTIC BRONZE FOR BUSHINGS AND PINS

FOR AUTOMOBILE SERVICE. SOLID OR CORED

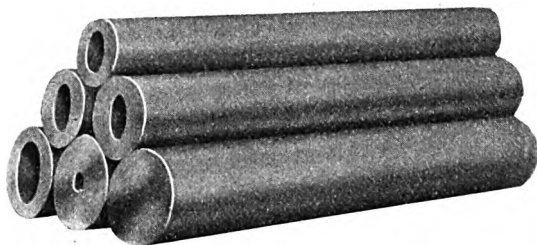


FIG. 1997

OUR "REX" BRAND PHOSPHOR BRONZE

Cored and solid blanks, made from Virgin stock which necessarily places it in the highest class of phosphor metal offered to the trade. This metal has proven the most popular among the automobile trade.

OUR "REX" PLASTIC BRONZE BLANKS

Are of a different formula and mixture having special contents of lubricating qualities not to be found in phosphor bronze. This metal is highly recommended for all classes of work and particularly where phosphor bronze may not meet requirements.

SOLID BLANKS

Diam., inch.....	1/2	5/8	3/4	7/8	1	1 1/4	1 1/2	1 3/4	2	2 1/4	2 1/2	3
Length, inch.....	12	12	12	12	12	12	12	12	12	12	12	12
Approximate weight, each, lbs.....	7/8	1	1 1/2	2	3	5	7 1/8	9 1/2	12 1/2	13 1/2	18 1/2	26

CORED BLANKS

Outside diameter, inch.....	1	1 1/4	1 1/2	1 3/4	2	2 1/4	2 1/2	2 3/4	3	3 1/4	3 1/2	4
Core diameter, inch.....	1/2	1 1/2	1 3/4	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2
Length, inch.....	6	6	6	6	6	12	12	12	12	12	12	12
Approximate weight, each, lb.....	1 1/8	2	1 1/4	3	2 1/2	2	7 1/2	6	4 1/2	9 3/4	9	7 1/2
Outside diameter, inch.....	2	2 1/4	2 1/2	2 3/4	3	3 1/4	3 1/2	3 3/4	4	4 1/4	4 1/2	5
Core diameter, inch.....	1 1/2	1	1 1/4	1 1/2	1 1/2	1 1/4	1 1/2	1 1/4	1	1 1/4	1 1/2	1 1/2
Length, inch.....	12	12	12	12	12	12	12	12	12	12	12	12
Approximate weight, each, lb.....	6	12	10	8 1/2	15	13	11	10	19 1/2	18	16	13 1/2
Outside diameter, inch.....	..	..	..	..	..	..	2 3/4	3	3	3	3	3
Core diameter, inch.....	..	..	..	..	..	..	2	1	1 1/4	1 1/2	1 3/4	2
Length, inch.....	..	..	..	..	..	..	12	12	12	12	12	12
Approximate weight, each, lb.....	..	..	..	..	..	..	10 1/2	24	22	20	17 1/2	13

Phosphor Bronze. Price per pound.....
Plastic Bronze. Price per pound.....

BUNTING BEARING BRONZE

SOLID AND CORED



FIG. 1998

Bunting Cored Bars are made of the best possible composition for every test and use—have maximum life and low coefficient of friction.

Each bar is cleaned by sand blasting; carefully inspected and then packed in an individual carton. The carton is labeled and the bar itself has the raised letters B. B. B. No. 1 cast into it for your protection.

All bars are furnished in the rough. When ordering always allow 1/8-inch for finish on both inside and outside dimensions.

Outside Diam. in.	Inside Diam. in.	Length inches	Approx. Wt. lbs.	Price per lb.
3/4	Solid	12	2	.....
7/8	Solid	12	2 1/2	.....
1	1/2	12	2 1/4	.....
1 1/4	5/8	12	3 1/2	.....
1 3/8	3/4	12	4	.....
1 1/2	7/8	12	4 1/2	.....
1 5/8	1	12	5	.....
1 3/4	3/4	12	7	.....
2	1	12	8 1/2	.....
2 1/4	1 1/4	12	10	.....
2 1/2	1 1/2	12	11 1/2	.....
2 3/4	1 3/4	12	12 3/4	.....
3	2	12	13 3/4	.....
3 1/4	2 1/4	12	15 1/2	.....
3 1/2	2 1/2	12	17	.....
4	3	12	20	.....
4 1/4	3 1/4	12	21	.....

IRIDIUM WHITE METAL

Made of a very high content of tin and is without doubt the best cored high grade automobile metal offered to the trade. This metal is cast in finished sizes of standard dimensions.

Iridium White Metal. Price per pound.....

CAST IRON PISTON RING STOCK

HIGH GRADE—FINE GRAIN

Our ring stock is cast from the best iron and if found defective or in any way unfit on account of blow holes same will be replaced by us.

When ordering piston ring stock, give size of ring when in finished state. Our stock all runs slightly over size to provide for the spring in the ring.

The following sizes are carried in stock. Dimensions given are in inches.

Smaller diameters or greater lengths can be furnished if desired.

Outside Diameter	Inside Diameter	Approximate Length	Outside Diameter	Inside Diameter	Approximate Length
2 $\frac{3}{8}$	1 $\frac{5}{8}$	4	4 $\frac{5}{8}$	3 $\frac{3}{8}$	5
2 $\frac{5}{8}$	1 $\frac{7}{8}$	4	4 $\frac{7}{8}$	4 $\frac{1}{8}$	5
2 $\frac{7}{8}$	2 $\frac{1}{8}$	4	5 $\frac{1}{8}$	4 $\frac{3}{8}$	6
3 $\frac{1}{8}$	2 $\frac{3}{8}$	4	5 $\frac{3}{8}$	4 $\frac{5}{8}$	6
3 $\frac{3}{8}$	2 $\frac{5}{8}$	4	5 $\frac{5}{8}$	4 $\frac{7}{8}$	6
3 $\frac{5}{8}$	2 $\frac{7}{8}$	4	5 $\frac{7}{8}$	5 $\frac{1}{8}$	6
3 $\frac{7}{8}$	3 $\frac{1}{8}$	5	6 $\frac{1}{8}$	5 $\frac{3}{8}$	6
4 $\frac{1}{8}$	3 $\frac{3}{8}$	5	6 $\frac{3}{8}$	5 $\frac{5}{8}$	6
4 $\frac{3}{8}$	3 $\frac{5}{8}$	5			

Price per pound..... \$.....

LAMINUM

THE MATERIAL FOR SHIMS

LAMINUM IS THE MODERN MATERIAL FOR ALL SHIMMING PURPOSES

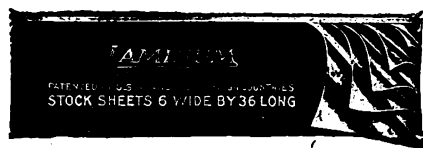
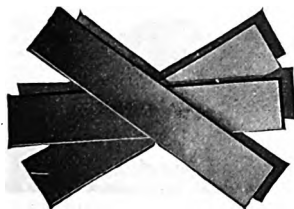


FIG. 1999

FIG. 2000
BOX ASSORTMENTS

The careful study and experiments of specialists has evolved laminum, which, as its name implies, is a material composed of innumerable thin layers of laminations of hard brass held together by a metal binder. These layers are made in two thicknesses .002" and .003". By peeling off successive layers of the metal anyone may obtain a perfectly smooth, solid and uniform shim of any desired exact thickness.

For the convenience of automobile repair men and mechanics, Laminum is put up in various packages, which are listed opposite.

NO. 1 ASSORTMENT—\$3.00

Containing 1 strip each of the following:

$\frac{1}{32}$ "x2"x9" (All .002" Laminations)

$\frac{1}{16}$ "x2"x9" (Half .002" Laminated and Half Solid Brass)

$\frac{1}{8}$ "x2"x9" (Half .002" Laminated and Half Solid Brass)

NO. 2 ASSORTMENT—\$2.75

Containing one strip each of the following:

$\frac{1}{32}$ "x2"x9" (All .003" Laminations)

$\frac{1}{16}$ "x2"x9" (Half .003" Laminated and Half Solid Brass)

$\frac{1}{8}$ "x2"x9" (Half .003" Laminated and Half Solid Brass)

NO. 3 ASSORTMENT—\$2.00

Containing 3 strips of

$\frac{1}{32}$ "x2"x9" (All .002" Laminations)

NO. 4 ASSORTMENT—\$2.00

Containing 3 strips of

$\frac{1}{32}$ "x2"x9" (All .003" Laminations)

NO. 5 ASSORTMENT—\$1.25

Containing 3 strips of

$\frac{1}{16}$ "x2"x9" (All .002" Laminations)

NO. 6 ASSORTMENT—\$1.25

Containing 3 strips of

$\frac{1}{16}$ "x2"x9" (All .003" Laminations)

IN SHEETS 6x36 INCHES

Stock No.	Thickness Inches	Thickness of Laminations & Solid Sheets	Approx. Wt. per Sheet in lbs.	Price Per Lb.	Stock No.	Thickness Inches	Thickness of Laminations & Solid Sheets	Approx. Wt. per Sheet in lbs.	Price Per Lb.
L-1	$\frac{1}{32}$	.003 or .002	1	.....	S-2	$\frac{1}{32}$	$\frac{1}{32}$ Solid; .002 or .003	6 $\frac{3}{8}$	.....
L-2	$\frac{1}{16}$	.003 or .002	2 $\frac{1}{8}$	.....	S-3	$\frac{1}{16}$	" " " " "	6 $\frac{3}{8}$	.....
L-3	$\frac{1}{8}$	.003 or .002	4 $\frac{1}{4}$	.....	S-4	$\frac{1}{8}$	" " " " "	8 $\frac{1}{2}$	.....
L-4	$\frac{3}{16}$	.003 or .002	6 $\frac{3}{8}$	.....	S-5	$\frac{3}{16}$	" " " " "	8 $\frac{1}{2}$	.....
L-5	$\frac{1}{4}$	.003 or .002	8 $\frac{1}{2}$	.....	S-6	$\frac{1}{4}$	" " " " "	10 $\frac{5}{8}$	.....
L-6	$\frac{5}{16}$	.003 or .002	10 $\frac{5}{8}$	.....	S-7	$\frac{5}{16}$	" " " " "	10 $\frac{5}{8}$	.....
S-1	$\frac{1}{8}$	$\frac{1}{32}$ Solid; .002 or .003	4 $\frac{1}{4}$	.....	S-8	$\frac{3}{8}$	" " " " "	12 $\frac{3}{4}$	.....
					S-9	$\frac{1}{2}$	" " " " "	12 $\frac{3}{4}$	.....

When ordering Stock Sheets advise: Total thickness required. Laminations required .002 or .003. Whether all Laminated or part solid and part Laminated.

LAMINUM SHIMS

FOR MAXWELL, CHEVROLET, DODGE, OVERLAND, FORD AND CONTINENTAL MOTORS

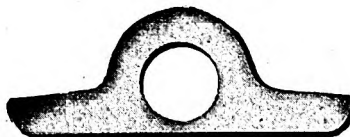
Simply lift one corner of top layer with penknife, and peel off with thumb and first finger. No loose leaves to slip and drop—no way for dirt, grit and that demon, "inaccuracy," to slip between the layers. None of the expense of filing ever present with the solid brass shim. Nothing but comfort and at a trifling price.

CONNECTING ROD



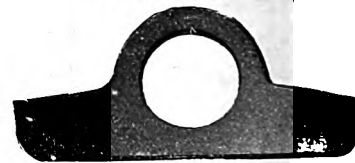
MAXWELL
FIG. 2001

CONNECTING ROD



CHEVROLET FOUR-NINETY
FIG. 2002

CONNECTING ROD



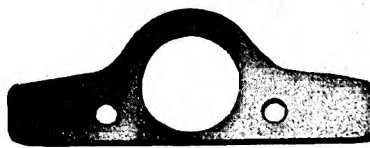
DODGE
FIG. 2003

CONNECTING ROD



CONTINENTAL 7-N
FIG. 2004

CONNECTING ROD



CONTINENTAL 7-W
FIG. 2005

CONNECTING ROD



OVERLAND
FIG. 2006

LAMINUM SHIMS FOR FORD CARS



FORD SHIM NO. 4—CONNECTING ROD
FIG. 2010



FORD SHIM NO. 2—CRANK-SHAFT CENTER BEARING
FIG. 2008



FORD SHIM NO. 1—CRANK-SHAFT FRONT BEARING
FIG. 2007

PRICE LIST IN PACKAGES OF 25

FOR MAXWELL, CHEVROLET, DODGE, OVERLAND AND CONTINENTAL MOTORS

FOR FORD CARS

Thickness, in.	$\frac{1}{64}$	$\frac{1}{16}$	$\frac{1}{32}$	$\frac{1}{8}$		$\frac{1}{64}$	$\frac{1}{8}$
Maxwell.....	\$1.00	\$2.50	\$1.50	....	No. 1, For crank-shaft front bearing.....	\$2.00	\$3.25
Chevrolet 490.....	1.00	2.50	1.50	....	No. 2, For crank-shaft center bearing.....	1.50	2.25
Dodge.....	1.25	3.00	1.75	\$5.00	No. 4, For connecting rod.....	1.25	1.50
Continental, 7-N.....	1.00	2.50	1.50	5.00			
Continental, 7-W.....	1.00	2.50	1.25	....		
Overland.....	1.25	3.00	1.75	....		

Please state thickness and laminations desired. $\frac{1}{32}$.003 will be shipped unless sizes are specified.

COLD ROLLED SHIM STEEL

FIG. 2011

Thick-ness	Width Inches	Thick-ness	Width Inches
.002	4	.007	6
.003	4	.008	6
.004	4	.009	6
.005	4	.010	6
.006	6	.014	6

Price per pound.....

SHIMMING COPPER

Used extensively for shimming and other purposes. It is soft and is easily cut with ordinary shears. Stock runs 6 inches wide and in 50-pound rolls.

Thickness	Feet per pound	Price per pound
.002	8	.....
.005	4½	.....
.010	2¼	.....

ASSORTED STEEL AND BRASS SHIM STOCK

Furnished in rolls 50-inches long and 2½ inches wide. Also furnished in can containing four rolls in assorted thicknesses; .002, .005, .010 and .015 inch.



FIG. 2012

STEEL AND BRASS

Thickness	Price per Pound
.002	\$3.00
.003	2.25
.004	2.25
.005	2.00
.010	2.00
.015	1.50

Assorted Shim Steel per can..... \$2.00

Assorted Shim Brass per can 2.00

BRASS SHEETS**HALF HARD****SHEETS 12x96 INCHES**

B. and S. Gauge.....	2	3	5	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36
Thickness, inch.....	¼	⅜	½	⅝	¾	⅞	.080	.064	.051	.040	.032	.025	.020	.016	.013	.010	.008	.006
Wt. Sq. ft., lbs.....	11.41	10.16	8.05	5.69	4.51	3.58	2.84	2.25	1.78	1.42	1.12	.89	.71	.56	.44	3.52	.28	.21
Extras per 100 lbs.....	\$2.50	2.50	.50	.50	.50	.50	1.00	1.00	1.50	2.00	2.75	3.50	4.15	5.00	7.00	9.00	11.00	14.50

SHEETS 8x96 INCHES

B. and S. Gauge.....	14	16	18	20
Base.....	.....	.....	.....	.....

SHEETS 10x96 INCHES

B. and S. Gauge.....	14	16	18	20
Base.....	.....	.....	.....	.....

SHEETS 14x96 INCHES

B. and S. Gauge.....	14	16	18	20	22	24
Extras per 100 lbs.....	\$2.00	2.00	2.50	3.00	3.75	4.50

SHEETS 16x96 INCHES

B. and S. Gauge.....	14	16	18	20	22	24
Extras per 100 lbs.....	\$3.00	3.00	3.75	4.50	5.25	6.00

SHEETS 18x96 INCHES

B. and S. Gauge.....	14	16	18	20	22	24
Extras per 100 lbs.....	\$5.00	5.00	5.00	5.00	6.00	6.00

SHEETS 24x72 INCHES

B. and S. Gauge.....	14	16	18	20	22	24
Per 100 lbs., Extra over Base.....	\$11.50					

SPRING SHEET BRASS**SHEETS ABOUT 8x72 INCHES**

B. and S. Gauge.....	14	16	18	20	22	24
Per 100 lbs., Extra over Base.....	\$1.50	1.50	2.00	2.50	2.75	3.50

SOFT SHEET BRASS**IN ROLLS OF ABOUT 50 LBS. EACH. 12 AND 14 INCHES WIDE**

B. and S. Gauge.....	16	18	20	22	24	26	28	30	32	36
2 in. wide, Extras per 100 lbs.....	\$1.00	1.50	2.00	2.75	3.50	4.25	5.00	7.00	9.00	14.50
4 in. wide, Extras per 100 lbs.....	\$2.00	2.50	3.00	3.75	4.50	5.25	6.00	8.00		....

BRASS RODS

ROUND BARS ABOUT 12 FEET LONG		
Diameter, inch.	Weight per ft., lbs.	Price per lb.
$\frac{1}{8}$	.045	.....
$\frac{3}{16}$	.075	.....
$\frac{1}{4}$	.102	.....
$\frac{5}{16}$	.181	.....
$\frac{3}{8}$	.283	.....
$\frac{7}{16}$	.407	.....
$\frac{1}{2}$	.544	.....
$\frac{5}{8}$	.724	.....
$\frac{3}{4}$	.916	.....
$\frac{7}{8}$	1.132	.....
1	1.630	.....
$1\frac{1}{8}$	2.218	.....
$1\frac{1}{4}$	2.897	.....
$1\frac{3}{8}$	3.667	.....
$1\frac{1}{2}$	4.527	.....
$1\frac{3}{4}$	5.477	.....
$1\frac{7}{8}$	6.519	.....
2	7.650	.....
$2\frac{1}{8}$	8.873	.....
$2\frac{1}{4}$	10.19	.....
BARS ABOUT 9 FEET LONG		
2	11.59	.....
$2\frac{1}{4}$	14.67	.....
$2\frac{1}{2}$	18.11	.....
3	26.07	.....
RECTANGULAR BARS ABOUT 12 FEET LONG		
$1\frac{1}{8} \times \frac{3}{4}$	.54	.....
$1\frac{1}{4} \times \frac{1}{2}$	.48	.....
$1\frac{1}{4} \times \frac{3}{4}$	.72	.....

HEXAGON BARS ABOUT 12 FEET LONG		
Diameter, inch	Weight per ft., lbs.	Price per lb.
$\frac{1}{4}$	.20	.....
$\frac{3}{8}$	.3125	.....
$\frac{1}{2}$	.4630	.....
$\frac{5}{8}$	.8232	.....
$\frac{3}{4}$	.9753	.....
$\frac{7}{8}$	1.287	.....
1	1.557	.....
$1\frac{1}{8}$	1.853	.....
$1\frac{1}{4}$	2.02	.....
$1\frac{3}{8}$	2.521	.....
$1\frac{1}{2}$	3.293	.....
$1\frac{5}{8}$	3.718	.....
$1\frac{3}{4}$	5.145	.....
$1\frac{7}{8}$	6.805	.....
2	8.695	.....
$2\frac{1}{8}$	10.82	.....
$2\frac{1}{4}$	13.18	.....
$2\frac{3}{8}$	16.10	.....
$2\frac{1}{2}$	18.58	.....
SQUARE BARS ABOUT 12 FEET LONG		
$\frac{3}{8}$	.1297	.....
$\frac{1}{2}$	.2306	.....
$\frac{5}{8}$	.3603	.....
$\frac{3}{4}$	.5187	.....
$\frac{7}{8}$	.9222	.....
1	1.441	.....
$1\frac{1}{8}$	2.075	.....
$1\frac{1}{4}$	2.824	.....
$1\frac{3}{8}$	3.689	.....

TOBIN BRONZE ROD

ROUND

BARS ABOUT 14 FEET LONG

Diameter Inch	Wt. per foot lbs.	Price per lb.	Diameter Inch	Wt. per foot lbs.	Price per lb.	Diameter Inch	Wt. per foot lbs.	Price per lb.
$\frac{1}{8}$	.0447	.....	$\frac{5}{8}$	1.11	.....	$1\frac{1}{2}$	6.42	.....
$\frac{3}{16}$	.102	.....	$\frac{3}{4}$	1.60	.....	$1\frac{3}{4}$	8.70	.....
$\frac{1}{4}$	.181	.....	$\frac{7}{8}$	2.18	.....	2	11.38	.....
$\frac{5}{16}$	.283	.....	1	2.84	.....	$2\frac{1}{4}$	15.32	.....
$\frac{3}{8}$	.407	.....	$1\frac{1}{8}$	3.60	.....	$2\frac{1}{2}$	18.91	.....
$\frac{7}{16}$	.544	.....	$1\frac{1}{4}$	4.46	.....	$2\frac{3}{4}$	21.64	.....
$\frac{1}{2}$	.711	.....	$1\frac{3}{8}$	5.45	.....	3	25.75	.....

Weights given are approximately correct, but are not guaranteed.

COPPER RODS

BARS ABOUT 12 FEET LONG

ROUND—SOFT DRAWN			ROUND—HARD DRAWN, FINISHED			SQUARE—HARD DRAWN		
Diam. Inch	Wt. lbs. Lin. ft.	Price per lb.	Diam. Inch	Wt. lbs. Lin. ft.	Price per lb.	Diam. Inch	Wt. lbs. Lin. ft.	Price per lb.
$\frac{1}{4}$	.184	.....	$\frac{1}{4}$	.184	.....	$\frac{1}{4}$	.2412	.....
$\frac{3}{16}$	.289	.....	$\frac{3}{16}$	.289	.....	$\frac{3}{16}$	.3768	.....
$\frac{1}{8}$	.422	.....	$\frac{1}{8}$	.422	.....	$\frac{1}{8}$	.5426	.....
$\frac{5}{16}$	.756	.....	$\frac{5}{16}$	.756	.....	$\frac{5}{16}$	.7386	.....
$\frac{3}{8}$	1.182	.....	$\frac{3}{8}$	1.182	.....	$\frac{3}{8}$	.9646	.....
$\frac{7}{16}$	1.702	.....	$\frac{7}{16}$	1.702	.....	$\frac{7}{16}$	2.954	.....
$\frac{1}{2}$	2.32	.....	$\frac{1}{2}$	2.32	.....	1	3.858	.....
1	3.027	.....	1	3.027	.....		
$1\frac{1}{4}$	4.723	.....	$1\frac{1}{4}$	4.723	.....		
$1\frac{1}{2}$	6.81	.....	$1\frac{1}{2}$	6.81	.....		

ROUND COLD DRAWN SEAMLESS STEEL TUBING

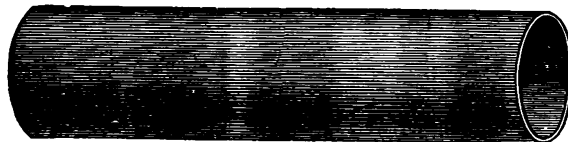


FIG. 2020

LIST PRICE PER FOOT

Thickness B.W.G. and Fractions	Equivalent in Decimal of Inch	Outside Diameter in Inches												
		½	⅝	¾	⅞	1	1⅕	1¼	1⅓	1½	1⅔	2	2¼	2½
20	.035	\$.25	\$.25	\$.29	\$.30	\$.32	\$.35	\$.36	\$.38	\$.39	.....	.....	.....	.....
18	.049	.29	.31	.36	.38	.41	.43	.46	.49	.51	.....	.....	.....	.....
16	.065	.31	.38	.42	.46	.51	.54	.57	.62	.65	\$.73	\$.81	\$.87	\$.94
14	.083	.36	.42	.50	.54	.61	.64	.70	.74	.79	.90	.94	1.06	1.07
13	.095	.37	.45	.51	.58	.64	.70	.77	.81	.85	.97	1.07	1.10	1.22
12	.109	.38	.47	.55	.63	.70	.77	.84	.90	.93	1.06	1.10	1.25	1.39
11	.120	.39	.48	.57	.66	.74	.81	.88	.93	.98	1.10	1.21	1.37	1.53
10	.134	...	.49	.60	.69	.77	.85	.92	.98	1.10	1.16	1.34	1.52	1.70
⅞	.156	...	...	.65	.75	.85	.93	1.00	1.02	1.12	1.33	1.54	1.75	1.96
⅞	.188	...	...	.71	.79	.94	1.03	1.07	1.19	1.32	1.57	1.82	2.07	2.32
⅞	.219	...	...	...	.89	.98	1.06	1.21	1.35	1.50	1.79	2.08	2.37	2.66
⅞	.250	...	...	...	...	1.00	1.17	1.34	1.50	1.67	2.00	2.34	2.67	3.00
⅞	.313	...	...	...	...	...	...	1.57	1.77	1.98	2.40	2.82	3.23	3.65
⅞	.375	...	...	...	...	...	...	1.75	2.00	2.25	2.75	3.25	3.50	4.25
⅞	.500	...	...	...	...	...	...	...	...	2.67	3.34	4.00	4.67	5.34
⅞	.625	...	...	...	...	...	...	...	...	...	...	4.59	5.42	6.25

WEIGHT IN POUNDS PER FOOT

Thickness B.W.G. and Fractions	Equivalent in Decimal of Inch	Outside Diameter in Inches												
		½	⅝	¾	⅞	1	1⅕	1¼	1⅓	1½	1⅜	2	2¼	2½
20	.035	\$.17	\$.22	\$.27	\$.31	\$.36	\$.41	\$.45	\$.50	\$.55	.....	.....	.....	.....
18	.049	.24	.30	.37	.43	.50	.56	.63	.69	.76	.....	.....	.....	.....
16	.065	.30	.39	.47	.56	.65	.74	.82	.91	1.00	\$1.17	\$1.34	\$1.52	\$1.69
14	.083	.37	.48	.59	.70	.81	.92	1.03	1.14	1.25	1.48	1.70	1.92	2.14
13	.095	.41	.54	.66	.79	.92	1.04	1.17	1.30	1.42	1.68	1.93	2.19	2.44
12	.109	.45	.60	.75	.89	1.04	1.18	1.33	1.47	1.62	1.91	2.20	2.49	2.78
11	.120	.49	.65	.81	.97	1.13	1.29	1.45	1.61	1.77	2.09	2.41	2.73	3.05
10	.134	...	.70	.88	1.06	1.24	1.42	1.60	1.77	1.95	2.31	2.67	3.03	3.39
⅞	.156	...	...	.99	1.20	1.41	1.61	1.82	2.03	2.24	2.66	3.07	3.49	3.91
⅞	.188	...	...	1.13	1.38	1.63	1.88	2.13	2.38	2.63	3.13	3.63	4.13	4.63
⅞	.218	...	...	...	1.53	1.82	2.12	2.41	2.70	2.99	3.57	4.16	4.74	5.32
¾	.250	...	...	...	...	2.00	2.33	2.67	3.00	3.33	4.00	4.67	5.33	6.00
⅞	.312	...	...	...	...	...	...	3.13	3.54	3.96	4.79	5.63	6.46	7.29
⅞	.375	...	...	...	...	...	...	3.50	4.00	4.50	5.50	6.50	7.50	8.50
⅞	.500	...	...	...	...	...	...	...	...	5.33	6.67	8.00	9.34	10.67
⅞	.625	...	...	...	...	...	...	...	...	...	...	9.17	10.84	12.50

SEAMLESS BRASS AND COPPER TUBING

Seamless Brass Tubing. Price per Pound Base.....
 Seamless Copper Tubing. Price per Pound Base.....

EXTRAS OVER BASE PRICES

STUBS' GAUGE THE STANDARD				OUTSIDE DIAMETER								ADOPTED NOVEMBER 13, 1908									
Stubs' Gauge	Decimal Equivalent	3/8	1/4	1/2	5/8	3/4	7/8	1	1 1/4	1 1/2	1 3/4	2	2 1/4	2 1/2	2 3/4	3	3 1/4	3 1/2	3 3/4		
4 to 11	.238 to .120	BASE PRICE											...	
12	.109
13 or 5/16	.095	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
14	.083	...	...	\$.07	\$.07	.07	.05	.05	.05	\$.01	\$.01	\$.01	\$.01	\$.01	\$.01	\$.01	\$.01	\$.01	\$.01
15	.072	...	\$.08	.07	.07	.07	.05	.05	.05	.01	.01	.01	.01	.01	.01	.01	.01	.01	.01		
16 or 3/8	.065	\$.08	.08	.07	.07	.07	.05	.05	.05	.02	.02	.02	.02	.02	.02	.02	.02	.02	.02		
17	.058	\$.08	.08	.07	.07	.07	.05	.05	.05	.03	.03	.03	.03	.03	.03	.03	.03	.05	.06		
18	.049	.09	.09	.08	.08	.08	.06	.06	.06	.04	.04	.04	.04	.04	.04	.06	.07	.08	.09		
19	.042	.09	.09	.08	.08	.08	.06	.06	.06	.05	.05	.05	.05	.05	.07	.08	.09	.10	.11		
20	.035	.09	.09	.08	.08	.08	.06	.06	.06	.06	.06	.06	.06	.07	.07	.08	.09	.11	.11		
21 or 1/2	.032	.11	.10	.10	.08	.08	.07	.07	.07	.07	.07	.07	.07	...	...	...	...	...	...
22	.028	.13	.13	.11	.11	.09	.08	.08	.08	.08	.08	.08	.08	...	...	...	...	...	...
23	.025	.15	.15	.13	.13	.11	.11	.11	.11	.11	.11	.13	.15	...	...	...	...	...	...
24	.022	.31	.26	.24	.23	.22	.21	.19	.18	.19	.19	.20	.21	...	...	...	...	...	...
25	.020	.34	.29	.27	.25	.24	.23	.22	.22	.23	.24	...	...	...	...	...	...	...	...

Stubs' Gauge	Decimal Equivalent	4	4 1/4	4 1/2	4 3/4	5	5 1/4	5 1/2	5 3/4	6	6 1/4	6 1/2	6 3/4	7	7 1/4	7 1/2	7 3/4	8	8 1/4	9
4 to 11	.238 to .120	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
12	.109	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
13 or 3/8	.095	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
14	.083	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
15	.072	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
16 or 1/2	.065	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
17	.058	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
18	.049	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
19	.042	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
20	.035	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
21 or 5/8	.032	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
22	.028	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
23	.025	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
24	.022	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
25	.020	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...

Sizes between gauges and diameter take the price of the gauge or diameter nearest.

When ordering tubing please specify whether Stubs or B. & S. Gauge, outside or inside diameter and whether hard or soft tubing is wanted. Prices quoted on application.

SEAMLESS BRASS AND COPPER TUBING

IRON PIPE SIZES—REGULAR

Same as Iron Pipe Inches	Outside Diam. Inches	Inside Diam. Inches	Approx. Weight Per Lineal Ft., Lbs.		Same As Iron Pipe Inches	Outside Diam. Inches	Inside Diam. Inches	Approx. Weight Per Lineal Ft., Lbs.	
			Brass	Copper				Brass	Copper
1/8	.405	.281	.2461	.2587	2 1/2	2.875	2.500	5.832	6.130
1/4	.540	.375	.4368	.4592	3	3.50	3.062	8.316	8.741
3/8	.675	.494	.6122	.6435	3 1/2	4.00	3.500	10.85	11.41
1/2	.840	.625	.9114	.9580	4	4.50	4.000	12.30	12.93
3/4	1.05	.822	1.235	1.298	4 1/2	5.00	4.500	13.74	14.45
1	1.315	1.062	1.740	1.829	5	5.563	5.062	15.40	16.19
1 1/4	1.66	1.368	2.558	2.688	6	6.625	6.125	18.45	19.39
1 1/2	1.90	1.600	3.038	3.194	7	7.625	7.062	23.92	25.15
2	2.375	2.062	4.018	4.223	8	8.625	8.000	30.06	31.60

Specific gravity, brass tube, 8.495 = .307 pounds per cubic inch.

Specific gravity, hard copper tube, 8.392 = .3227 pounds per cubic inch.

These weights are theoretically correct, but variations must be expected in practice.

ROUND POLISHED DRILL ROD

STUBS STEEL



FIG. 2013

For twist drills, taps, reamers, punches and all small tools requiring the very highest grade of crucible cast tool steel. Regularly furnished in lengths of 3 feet.

Sizes in Decimals of an Inch	Nearest Sizes in Fractions of an Inch	Prices per Pound	Nos.	Sizes in Decimals of an Inch	Nearest Sizes in Fractions of an Inch	Prices per Pound	Nos.	Sizes in Decimals of an Inch	Nearest Sizes in Fractions of an Inch	Prices per Pound
1.500	1 1/2	\$.50		0.484	31/64	\$.60	24	0.151		\$.83
1.4843	1 1/4	.50		0.469	15/32	.60	25	0.148		.83
1.4687	1 3/8	.50		0.453	23/64	.60	26	0.146		.83
1.4531	1 1/2	.50		0.437	7/16	.60	27	0.143		.83
1.4375	1 1/4	.50		0.425		.75		0.141	3/8	.83
1.4218	1 3/8	.50		0.421	21/64	.75	28	0.139		.83
1.4062	1 1/2	.50	Z	0.413		.75	29	0.134		.83
1.3906	1 1/4	.50		0.406	11/32	.75	30	0.127		.83
1.375	1 3/8	.50	Y	0.404		.75		0.125	1/8	.83
1.3593	1 1/2	.50	X	0.397		.75	31	0.120		.90
1.3437	1 1/4	.50		0.391	25/64	.75	32	0.115		.90
1.3281	1 3/8	.50	W	0.386		.75	33	0.112		.90
1.3125	1 1/2	.50	V	0.377		.75	34	0.110		.90
1.2968	1 1/4	.50		0.375	3/8	.75		0.109	7/16	.90
1.2812	1 3/8	.50	U	0.368		.75	35	0.108		.90
1.2656	1 1/2	.50		0.359	22/64	.75	36	0.106		.90
1.250	1 1/4	.50	T	0.358		.75	37	0.103		.90
1.2343	1 3/8	.50	S	0.348		.75	38	0.101		.90
1.2187	1 1/2	.50		0.344	11/32	.75	39	0.099		1.05
1.2031	1 1/4	.50	R	0.339		.75	40	0.097		1.05
1.1875	1 3/8	.50	Q	0.332		.75	41	0.095		1.05
1.1718	1 1/2	.50		0.328	21/64	.75		0.094	3/16	1.05
1.1562	1 1/4	.50	P	0.323		.75	42	0.092		1.05
1.1406	1 3/8	.50	O	0.316		.75	43	0.088		1.05
1.125	1 1/2	.50		0.312	1/8	.75	44	0.085		1.05
1.1093	1 1/4	.50	N	0.302		.75	45	0.081		1.05
1.093	1 3/8	.50		0.297	11/32	.75	46	0.079		1.05
1.078	1 1/2	.50	M	0.295		.75		0.078	1/4	1.05
1.062	1 1/4	.50	L	0.290		.75	47	0.077		1.20
1.046	1 3/8	.50	K	0.281	3/16	.75	48	0.075		1.20
1.031	1 1/2	.50	J	0.277		.75	49	0.072		1.20
1.015	1 1/4	.50	I	0.272		.75	50	0.069		1.20
1.	1	.50	H	0.266	11/16	.75	51	0.066		1.45
0.984	3/4	.50	G	0.261		.75	52	0.063		1.45
0.969	11/16	.50	F	0.257		.75		0.0625	1/8	1.45
0.953	5/8	.50	E	0.250	1/4	.75	53	0.058		1.45
0.937	11/16	.50	D	0.246		.75	54	0.055		1.45
0.921	5/8	.50	C	0.242		.75	55	0.050		1.80
0.906	11/16	.50	B	0.238		.75		0.0468	3/16	1.80
0.890	5/8	.50	A	0.234	11/16	.75	56	0.045		1.80
0.875	11/16	.50	1	0.227		.75	57	0.042		1.80
0.859	5/8	.50	2	0.219	7/16	.75	58	0.041		2.10
0.844	11/16	.50	3	0.212		.75	59	0.040		2.10
0.828	5/8	.50	4	0.207		.75	60	0.039		2.10
0.812	11/16	.50	5	0.204		.75	61	0.038		2.40
0.796	5/8	.50		0.203	11/16	.75	62	0.037		2.40
0.781	11/16	.50	6	0.201		.75	63	0.036		2.70
0.765	5/8	.50	7	0.199		.75	64	0.035		2.70
0.750	11/16	.55	8	0.197		.75	65	0.033		2.70
0.734	5/8	.55	9	0.194		.75	66	0.032		3.00
0.719	11/16	.55	10	0.191		.75	67	0.031	3/16	3.00
0.703	5/8	.55	11	0.188	1/8	.75	68	0.030		3.00
0.687	11/16	.55	12	0.185		.75	69	0.029		3.30
0.671	5/8	.55	13	0.182		.75	70	0.027		3.30
0.656	11/16	.55	14	0.180		.75	71	0.026		3.60
0.640	5/8	.55	15	0.178		.75	72	0.024		3.60
0.625	11/16	.55	16	0.175		.83	73	0.023		3.60
0.609	5/8	.55	17	0.172	11/16	.83	74	0.022		3.90
0.594	11/16	.55	18	0.168		.83	75	0.020		4.05
0.578	5/8	.55	19	0.164		.83	76	0.018		4.20
0.562	11/16	.55	20	0.161		.83	77	0.016	1/4	4.50
0.546	5/8	.55	21	0.157		.83	78	0.015		4.80
0.531	11/16	.55		0.156	1/8	.83	79	0.014		5.10
0.515	5/8	.55	22	0.155		.83	80	0.013		5.40
0.500	1 1/2	.60	23	0.153		.83				

SQUARE DRILL RODS

Sizes in Decimals of an Inch	Nearest Sizes in Fractions of an Inch	Prices per Pound	Sizes in Decimals of an Inch	Nearest Sizes in Fractions of an Inch	Prices per Pound	Sizes in Decimals of an Inch	Nearest Sizes in Fractions of an Inch	Prices per Pound
0.500	$\frac{1}{2}$	\$1.60	0.344	$\frac{11}{32}$	\$ 1.60	0.1875	$\frac{3}{16}$	\$1.60
0.4687	$\frac{3}{8}$	1.60	0.3125	$\frac{5}{16}$	1.60	0.156	$\frac{1}{4}$	1.60
0.4375	$\frac{7}{16}$	1.60	0.281	$\frac{9}{32}$	1.60	0.125	$\frac{1}{8}$	1.60
0.4062	$\frac{13}{32}$	1.60	0.250	$\frac{1}{4}$	1.60	0.094	$\frac{3}{32}$	1.60
0.375	$\frac{3}{8}$	1.60	0.219	$\frac{7}{32}$	1.60	0.0625	$\frac{1}{16}$	1.60

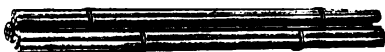


FIG. 2014

BESSEMER STEEL RODS

IN 6 FOOT LENGTHS

Size	Per lb.	Size	Per lb.	Size	Per lb.	Size	Per lb.	Size	Per lb.	Size	Per lb.
$\frac{1}{8}$	\$.20	$\frac{1}{4}$	\$.12	$\frac{3}{8}$	\$.10	$\frac{1}{2}$	\$.10	No. 1	\$.15	No. 9	\$.20
$\frac{1}{4}$	.20	$\frac{3}{8}$	.12	$\frac{1}{2}$	.10	$\frac{3}{4}$	.10	" 2	.15	" 10	.20
$\frac{3}{8}$	.20	$\frac{1}{2}$	.12	$\frac{3}{4}$	.10	$\frac{5}{8}$	.10	" 3	.15	" 11	.20
$\frac{1}{2}$	.20	$\frac{3}{4}$	.10	$\frac{5}{8}$	.10	$\frac{3}{4}$	.10	" 4	.15	" 12	.25
$\frac{3}{4}$	.20	$\frac{5}{8}$	.10	$\frac{3}{4}$	.10	$\frac{7}{8}$	.10	" 5	.15	" 13	.25
$\frac{5}{8}$	.15	$\frac{7}{8}$	.10	$\frac{7}{8}$	.10	1	.10	" 6	.20	" 14	.25
$\frac{7}{8}$	.15	1	.10	1	.10			" 7	.20	" 15	.25
1	.12	1	.10	1	.10			" 8	.20		

CHROME VANADIUM STEEL

FOR AUTOMOBILES. HOT OR COLD ROLLED



FIG. 2015

Chrome Vanadium Steel is an alloy of chromium and Vanadium under an improved special process. It is alloyed for the particular purposes of automobile use, the process changing the original granular form of steel to a fibrous structure which marks an increase in tensile strength and toughness. This steel is less liable to break and is recommended for the use of automobile repair men for the manufacture of axles and highly stressed parts. We carry this material in stock in the following sizes of rounds: 1, $1\frac{1}{8}$, $1\frac{1}{4}$, $1\frac{1}{2}$, $1\frac{3}{4}$, and $1\frac{7}{8}$ inch. Price per pound.....



FIG. 2016

COLD ROLLED STEEL

FLAT OR RECTANGULAR

FOR FINGER BARS, KNIFE BACKS, ENGINE GUIDES, KEYS, ELEVATOR SLIDES, ETC.

Size Inch	Wt. per Ft., lbs.	Price per lb.	Size Inch	Wt. per Ft., lbs.	Price per lb.	Size Inch	Wt. per Ft., lbs.	Price per lb.	Size Inch	Wt. per Ft., lbs.	Price per lb.	Size Inch	Wt. per Ft., lbs.	Price per lb.
$\frac{1}{8}$ x $\frac{1}{4}$	.053	....	$\frac{1}{2}$ x $2\frac{1}{2}$	.797	....	$\frac{1}{2}$ x $2\frac{1}{2}$	1.59	....	$\frac{1}{2}$ x $1\frac{3}{4}$	1.86	....	$\frac{1}{2}$ x 3	5.10	....
$\frac{1}{8}$ x $\frac{3}{8}$	.080	....	3	.956	....	3	1.91	....	2	2.13	....	$\frac{5}{8}$ x $\frac{3}{4}$	1.60	....
$\frac{1}{8}$ x $\frac{1}{2}$	.106	....	$\frac{3}{8}$ x $\frac{3}{8}$	.159	....	$\frac{1}{4}$ x $\frac{1}{4}$	.266	....	$2\frac{1}{2}$	2.66	....	$\frac{1}{8}$ x $\frac{1}{8}$	1.76	....
$\frac{1}{8}$ x $\frac{5}{8}$	.133	....	$\frac{1}{2}$ x $\frac{1}{2}$	.213	....	$\frac{3}{8}$ x $\frac{3}{8}$	.320	....	3	3.19	....	1	2.12	....
$\frac{1}{8}$ x $\frac{3}{4}$	.159	....	$\frac{3}{4}$ x $\frac{3}{4}$	.266	....	$\frac{1}{2}$ x $\frac{3}{8}$	.425	....	$\frac{3}{8}$ x $\frac{1}{2}$	.279	....	$1\frac{1}{4}$	2.66	....
$\frac{1}{8}$ x $\frac{7}{8}$	.186	....	$\frac{5}{8}$ x $\frac{5}{8}$	.320	....	$\frac{3}{4}$ x $\frac{3}{4}$	.533	....	$\frac{1}{2}$ x $\frac{5}{8}$	.638	....	$1\frac{1}{2}$	3.19	....
1	.212	....	$\frac{7}{8}$ x $\frac{7}{8}$	.372	....	$\frac{5}{8}$ x $\frac{3}{4}$	.640	....	$\frac{5}{8}$ x $\frac{3}{4}$	.798	....	$1\frac{3}{4}$	3.72	....
$1\frac{1}{8}$	.239	....	1	.426	....	$\frac{3}{4}$ x $\frac{5}{8}$	.743	....	$\frac{3}{4}$ x $\frac{1}{2}$	.960	....	2	4.28	....
$1\frac{1}{4}$	.265	....	$1\frac{1}{8}$	.479	....	1	.852	....	$\frac{7}{8}$ x $\frac{1}{2}$	1.12	....	$2\frac{1}{2}$	5.32	....
$1\frac{1}{2}$	.318	....	$1\frac{1}{4}$	.530	....	$1\frac{1}{8}$	.956	....	1	1.28	....	3	6.39	....
$1\frac{3}{4}$	.371	....	$1\frac{1}{2}$	.640	....	$1\frac{1}{4}$	1.06	....	$1\frac{1}{2}$	1.59	....	$\frac{3}{4}$ x $\frac{3}{8}$	2.23	....
2	.424	....	$1\frac{3}{4}$	.744	....	$1\frac{1}{2}$	1.28	....	$1\frac{3}{4}$	1.91	....	1	2.55	....
$2\frac{1}{2}$	.531	....	2	.850	....	$1\frac{3}{4}$	1.49	....	$2\frac{1}{2}$	2.23	....	$1\frac{1}{4}$	3.19	....
3	.638	....	$2\frac{1}{2}$	1.06	....	2	1.70	....	2	2.55	....	$1\frac{1}{2}$	3.83	....
$\frac{1}{2}$ x $\frac{3}{8}$	.120	....	3	1.28	....	$2\frac{1}{2}$	2.13	....	$2\frac{1}{2}$	3.19	....	$1\frac{3}{4}$	4.46	....
$\frac{1}{2}$ x $\frac{1}{2}$	.159	....	$\frac{1}{2}$ x $\frac{3}{8}$	.240	....	3	2.55	....	3	3.83	....	2	5.10	....
$\frac{1}{2}$ x $\frac{5}{8}$	.199	....	$\frac{1}{2}$ x $\frac{1}{2}$	.319	....	$\frac{1}{2}$ x $\frac{3}{4}$	.399	....	$\frac{1}{2}$ x $\frac{5}{8}$	1.07	....	$2\frac{1}{2}$	6.40	....
$\frac{1}{2}$ x $\frac{3}{4}$	.239	....	$\frac{3}{4}$ x $\frac{3}{4}$	.399	....	$\frac{1}{2}$ x 1	.465	....	$\frac{3}{4}$ x $\frac{3}{4}$	1.28	....	3	7.65	....
$\frac{1}{2}$ x $\frac{7}{8}$	.279	....	$\frac{5}{8}$ x $\frac{5}{8}$	.480	....	$\frac{1}{2}$ x $1\frac{1}{2}$	.531	....	1	1.70	....	$\frac{7}{8}$ x 1	2.98	....
1	.319	....	$\frac{3}{4}$ x $\frac{5}{8}$	.558	....	$\frac{1}{2}$ x $1\frac{3}{4}$	.655	....	$1\frac{1}{4}$	2.13	....	$1\frac{1}{2}$	4.25	....
$1\frac{1}{8}$	.359	....	1	.639	....	$\frac{1}{2}$ x $1\frac{1}{2}$	.800	....	$1\frac{1}{2}$	2.55	....	$1\frac{1}{2}$	5.10	....
$1\frac{1}{4}$	.398	....	$1\frac{1}{4}$	.790	....	$\frac{1}{2}$ x $1\frac{3}{4}$	.929	....	$1\frac{3}{4}$	2.98	....	2	6.80	....
$1\frac{1}{2}$	.478	....	$1\frac{1}{2}$	.960	....	1	1.06	....	2	3.40	....	$2\frac{1}{2}$	8.52	....
$1\frac{3}{4}$	.558	....	$1\frac{3}{4}$	1.12	....	$1\frac{1}{4}$	1.33	....	$2\frac{1}{4}$	3.83	....	3	10.20	....
2	.638	....	2	1.28	....	$1\frac{1}{2}$	1.60	....	$2\frac{1}{2}$	4.26	....			....

COLD ROLLED STEEL



FIG. 2017

ACCURATELY STRAIGHTENED

ROUND

FOR SHAFTING, PISTON RODS, ELEVATOR RODS, AXLES, ETC.;
TURNED AND POLISHED, MICROMETER GAUGE.

Diam., Inches.	Wt. per Foot, lbs.	Per Pound	Diam., Inches.	Wt. per Foot, lbs.	Per Pound	Diam., Inches.	Wt. per Foot, lbs.	Per Pound	Diam., Inches.	Wt. per Foot, lbs.	Per Pound
1/8	.042	.....	1 1/8	3.014	.....	2 1/4	13.52	.....	3 1/2	32.71	.....
1/16	.094	.....	1 1/8	3.379	.....	2 3/8	14.28	.....	3 3/8	33.90	.....
1/16	.130	.....	1 1/8	3.766	.....	2 3/8	15.07	.....	3 3/8	35.09	.....
1/16	.167	.....	1 1/8	4.173	.....	2 3/8	15.86	.....	3 3/8	36.31	.....
1/16	.234	.....	1 1/8	4.600	.....	2 3/8	16.69	.....	3 3/8	37.56	.....
1/16	.261	.....	1 1/8	5.049	.....	2 3/8	17.53	.....	3 3/8	38.81	.....
1/16	.320	.....	1 1/8	5.518	.....	2 3/8	18.40	.....	3 3/8	40.10	.....
1/16	.375	.....	1 1/8	6.01	.....	2 3/8	19.29	.....	3 3/8	41.40	.....
1/16	.450	.....	1 1/8	6.52	.....	2 3/8	20.20	.....	4	42.73	.....
1/16	.511	.....	1 1/8	7.05	.....	2 3/8	21.12	.....	4 1/8	46.83	.....
1/16	.667	.....	1 1/8	7.60	.....	2 3/8	22.07	.....	4 1/8	48.24	.....
1/16	.845	.....	1 1/8	8.18	.....	2 3/8	23.04	.....	4 1/8	52.58	.....
1/16	1.043	.....	1 1/8	8.77	.....	3	24.03	.....	4 1/8	54.07	.....
1/16	1.262	.....	1 1/8	9.39	.....	3 1/8	25.04	.....	4 1/8	60.25	.....
1/16	1.502	.....	1 1/8	10.02	.....	3 1/8	26.08	.....	4 1/8	65.10	.....
1/16	1.763	.....	2	10.68	.....	3 1/8	27.13	.....	5	66.76	.....
1/16	2.044	.....	2 1/8	11.36	.....	3 1/8	28.20	.....	5 1/8	78.95	.....
1/16	2.347	.....	2 1/8	12.07	.....	3 1/8	29.30	.....	5 1/8	80.77	.....
1	2.670	.....	2 1/8	12.78	.....	3 1/8	30.42	.....	5 1/8	94.14	.....
						3 1/8	31.56	.....	6	96.14	.....



FIG. 2018

SQUARE

FOR KEYS, SPLINES, SQUARE SHAFTS, ETC.

Size, Inches.	Wt. per Foot, lbs.	Per Pound	Size, Inches.	Wt. per Foot, lbs.	Per Pound	Size, Inches.	Wt. per Foot, lbs.	Per Pound	Size, Inches.	Wt. per Foot, lbs.	Per Pound
1/8	.12	.....	1 1/8	1.61	.....	1 3/8	6.43	.....	2	13.60	.....
1/16	.165	.....	3/4	1.92	.....	1 1/2	7.66	.....	2 1/4	17.25	.....
1/16	.213	.....	1 1/8	2.25	.....	1 1/2	7.02	.....	2 1/4	21.26	.....
1/16	.270	.....	1 1/8	2.60	.....	1 1/2	8.30	.....	2 3/4	25.72	.....
1/16	.332	.....	1 1/8	2.99	.....	1 1/2	8.98	.....	3	30.61	.....
1/16	.405	.....	1 1/8	3.40	.....	1 1/2	9.68	.....	3 1/4	35.92	.....
1/16	.479	.....	1 1/8	3.85	.....	1 1/2	10.41	.....	3 1/4	41.67	.....
1/16	.652	.....	1 1/8	4.30	.....	1 1/2	11.17	.....	3 3/4	47.84	.....
1/16	.850	.....	1 1/8	4.79	.....	1 1/2	11.95	.....	4	54.42	.....
1/16	1.08	.....	1 1/4	5.31	.....	1 1/2	12.76	.....	.....	.....	.....
1/16	1.34	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....



FIG. 2019

HEXAGON

FOR SPECIAL CAP SCREWS, NUTS, SHAFTING, ETC.

Size, Inches.	Wt. per Foot, lbs.	Per Pound	Size, Inches.	Wt. per Foot, lbs.	Per Pound	Size, Inches.	Wt. per Foot, lbs.	Per Pound	Size, Inches.	Wt. per Foot, lbs.	Per Pound
1/4	.195	.....	1 1/8	.82	.....	1 3/8	2.40	.....	1 3/8	5.57	.....
1/8	.23	.....	1 1/8	.93	.....	1 1/2	2.53	.....	1 1/2	6.07	.....
1/16	.29	.....	1 1/8	1.10	.....	1 1/2	2.94	.....	1 1/2	6.62	.....
1/16	.36	.....	1 1/8	1.15	.....	1 1/2	3.33	.....	1 1/2	7.17	.....
1/16	.43	.....	1 1/8	1.40	.....	1 1/2	3.52	.....	1 1/2	7.76	.....
1/16	.50	.....	1 1/8	1.52	.....	1 1/2	3.73	.....	1 1/2	8.37	.....
1/16	.56	.....	1 1/8	1.66	.....	1 1/2	4.15	.....	1 1/2	9.00	.....
1/16	.64	.....	1 1/8	1.91	.....	1 1/2	4.60	.....	1 1/2	10.32	.....
1/16	.73	.....	1 1/8	2.25	.....	1 1/2	5.07	.....	2	12.70	.....

TOOL STEEL

We can supply a very high grade of High Speed Steel recommended and extensively used for:

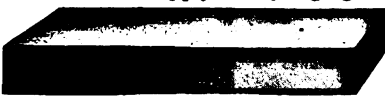


FIG. 2021

Lathe Tools,
Planer Tools,
Boring Tools,
Rail and other Drills,
Etc., Etc.,

Taps,
Reamers,
Twist & Straight Drills,
Milling Cutters,
End Mills,

Slotting Cutters,
Threading Cutters,
Dies,
Gear Cutters,
Blanking & Screw

Insert Reamer Blades,
Segmental Taps,
Formed Milling Tools,
Intricate Special Cutters,
Cutting Dies, Etc., Etc.

This steel forges easily. Anneals and machines readily and responds perfectly to heat treatment.

We can furnish in any length bars annealed or unannealed, rounds, squares, octagons and flats.

Price per pound..... \$.....

BASE SIZES

Round, Square and Octagon— $\frac{3}{8}$ inch to 2 inches inclusive.

Flat— $\frac{3}{8}$ inch to 2 inches thick by $\frac{5}{8}$ inch to 2 inches wide.

All dimensions inclusive. Intermediate sizes take the next higher extra.

EXTRA SIZES

ROUND, SQUARE AND OCTAGON

Inches	Extra per Lb. Cents	Inches	Extra per Lb. Cents	Inches	Extra per Lb. Cents
$\frac{1}{8}$ to $\frac{1}{4}$	2.0	$2\frac{5}{8}$ to 3	2.5	$5\frac{1}{8}$ to $5\frac{1}{2}$	5.0
$\frac{1}{8}$ to $\frac{3}{8}$	3.5	$3\frac{1}{8}$ to $3\frac{1}{2}$	3.0	$5\frac{5}{8}$ to 6	5.5
$\frac{1}{8}$ to $\frac{1}{2}$	6.0	$3\frac{3}{8}$ to 4	3.5	$6\frac{1}{8}$ to $6\frac{1}{2}$	6.0
$\frac{1}{4}$ to $\frac{3}{4}$	8.5	$4\frac{1}{8}$ to $4\frac{1}{2}$	4.0	$6\frac{5}{8}$ to 7	6.5
$2\frac{1}{8}$ to $2\frac{1}{2}$	2.0	$4\frac{5}{8}$ to 5	4.5	.....	...

EXTRA SIZES FLAT

Inches	Extra per Lb. Cents	Inches	Extra per Lb. Cents	Inches	Extra per Lb. Cents
$\frac{1}{8} \times \frac{1}{8}$	40.0	$\frac{5}{16} \times \frac{3}{4}$ to 1	3.5	$\frac{1}{2} \times 1\frac{1}{8}$ to 6	2.0
$\frac{1}{8} \times \frac{1}{4}$	30.0	$\frac{5}{16} \times 1\frac{1}{8}$ to $4\frac{1}{2}$	3.0	$\frac{5}{8} \times \frac{5}{8}$ to 1	2.5
$\frac{1}{8} \times \frac{3}{8}$	20.0	$\frac{3}{8} \times \frac{1}{8}$ to $\frac{3}{4}$	3.0	$\frac{5}{8} \times 1\frac{1}{8}$ to 6	2.0
$\frac{1}{8} \times \frac{1}{2}$ to 2	14.0	$\frac{3}{8} \times \frac{7}{8}$ to $1\frac{1}{2}$	3.0	$\frac{5}{8}$ to $2 \times \frac{5}{8}$ to 2	0.0
$\frac{1}{8} \times \frac{3}{4}$ to 3	14.0	$\frac{3}{8} \times 1\frac{5}{8}$ to 5	2.5	$\frac{5}{8}$ to $2 \times 2\frac{1}{8}$ to 4	2.0
$\frac{1}{4} \times \frac{1}{8}$ to $\frac{1}{2}$	8.0	$\frac{1}{2} \times \frac{1}{2}$ to 1	3.0	$\frac{5}{8}$ to $2 \times 4\frac{1}{8}$ to 7	4.0
$\frac{1}{4} \times \frac{1}{4}$ to 1	5.0	$\frac{1}{2} \times 1\frac{1}{8}$ to $5\frac{1}{2}$	2.5	$2\frac{1}{8}$ to $3 \times 2\frac{1}{8}$ to 4	2.0
$\frac{1}{4} \times 1\frac{1}{8}$ to 4	3.0	$1\frac{1}{2} \times \frac{5}{8}$ to 1	2.5	$2\frac{1}{8}$ to $3 \times 4\frac{1}{8}$ to 7	4.0
$\frac{1}{8} \times \frac{5}{8}$ to $\frac{5}{8}$	5.0	.....	...	.....	...

Intermediate sizes take the next higher extra

Annealing..... 2c per lb. extra

Bevels, same Classification as flats, plus 10c per lb. for shape

Cutting to Specified Single and Multiple Lengths.

	Per Lb., Cents		Per Lb., Cents
24 inches and over.....	1.0	12 inches to $17\frac{1}{8}$ inches.....	3.0
18 inches to $23\frac{1}{8}$ inches.....	2.0	6 inches to $11\frac{1}{8}$ inches.....	4.0

Less than 6 inches—Special Price

REX "AA" HARDENED HIGH SPEED STEEL FOR TOOL HOLDERS

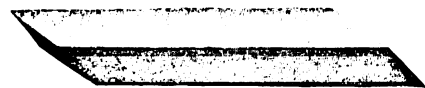


FIG. 2022

TOOL HOLDER LENGTHS

The ordinary standard sizes and lengths of Hardened High Speed Steel for Tool Holders are as follows:

Inch Square	Length, Inches	Price per Pound
$\frac{1}{4}$	$2\frac{1}{2}$	....
$\frac{1}{8}$	$2\frac{1}{2}$	....
$\frac{3}{8}$	3	....
$\frac{1}{2}$	$3\frac{1}{2}$	....
$\frac{3}{4}$	4	....
$1\frac{1}{8}$	4	....
$1\frac{1}{4}$	$4\frac{1}{2}$	....
$1\frac{3}{4}$	$4\frac{1}{2}$	....

The above lengths (with 30 degree bevel) will be furnished, unless otherwise specified.

We carry the above standard sizes, hardened ready for use, adaptable to all the standard makes of Tool Holders.

We supply High Speed Steel in squares up to 1 inch inclusive, hardened in the bar, ready for use in Tool Holders or otherwise.

A complete stock of small squares, single and double bevels, in three foot lengths hardened ready for use, is carried in stock.

It is not necessary to heat this steel, but it can be nicked on a sharp emery wheel, broken off to length desired, and then ground to the required cutting shape. Price per pound.....

HIGH SPEED HARDENED BEVELS FOR CUTTING OFF TOOLS

This steel is beveled about $\frac{3}{8}$ inch on each side for clearance.

Sizes Carried in Stock

Inch.	Price per Pound
$\frac{5}{8} \times \frac{3}{4}$	\$.....
$\frac{3}{4} \times \frac{1}{2}$
1 x $\frac{3}{8}$
$\frac{7}{8} \times \frac{1}{2}$
$1\frac{1}{8} \times \frac{1}{4}$
$1\frac{1}{8} \times \frac{3}{8}$
$1\frac{1}{4} \times \frac{1}{4}$

SOFT AND MACHINERY STEEL

STANDARD CLASSIFICATION. ADOPTED OCTOBER 1, 1909

ROUNDS AND SQUARES

Size, inch.....	Extra per 100 lbs.
$\frac{1}{4}$ to $3\frac{1}{8}$	Base
$\frac{1}{2}$ to $1\frac{1}{8}$	\$.10
$\frac{3}{4}$ to $1\frac{3}{8}$.....	.20
$1\frac{1}{2}$ to $2\frac{1}{8}$.....	.40
$2\frac{1}{2}$ to $3\frac{1}{8}$.....	.50
$3\frac{1}{2}$ to $4\frac{1}{8}$.....	.60
$4\frac{1}{2}$ to $5\frac{1}{8}$.....	.70
$5\frac{1}{2}$ to $6\frac{1}{8}$.....	.80
$6\frac{1}{2}$ to $7\frac{1}{8}$	1.00
$7\frac{1}{2}$ to $8\frac{1}{8}$	1.50
$8\frac{1}{2}$ to $9\frac{1}{8}$	2.00
$9\frac{1}{2}$ to $10\frac{1}{8}$	2.50
$10\frac{1}{2}$ to $11\frac{1}{8}$.....	.15
$11\frac{1}{2}$ to $12\frac{1}{8}$.....	.25
$12\frac{1}{2}$ to $13\frac{1}{8}$.....	.30
$13\frac{1}{2}$ to $14\frac{1}{8}$.....	.40
$14\frac{1}{2}$ to $15\frac{1}{8}$.....	.50
$15\frac{1}{2}$ to $16\frac{1}{8}$.....	.75
$16\frac{1}{2}$ to $17\frac{1}{8}$	1.00
$17\frac{1}{2}$ to $18\frac{1}{8}$	1.25

For intermediate sizes, the next higher extra to be charged in all cases.

HALF OVALS

Size, inch.....	Extra per 100 lbs.
$\frac{1}{4}$ to $4 \times \frac{1}{2}$ to $1\frac{1}{2}$	\$.50
$1\frac{1}{2} \times \frac{5}{8}$ (Special).....	.50
$\frac{1}{2} \times 1\frac{1}{8}$.....	.80
$\frac{3}{4} \times 1\frac{3}{8}$	1.00
$1 \times 1\frac{1}{2}$	1.30
$1 \times \text{No. 13}$	1.80
$2 \times 1\frac{1}{2}$	1.30
$2 \times 1\frac{3}{4}$	2.10
$3 \times 1\frac{1}{2}$ to $3\frac{1}{2}$	2.50

HALF ROUNDS

Size, inch.....	Extra per 100 lbs.
$\frac{1}{4}$ to $2\frac{1}{8}$	\$.50
$\frac{1}{2}$ to $1\frac{1}{8}$.....	.80
$\frac{3}{4}$ and $1\frac{1}{8}$	1.00
$1\frac{1}{2}$ to $2\frac{1}{8}$	1.30
$2\frac{1}{2}$ to $3\frac{1}{8}$	2.10
$3\frac{1}{2}$ to $4\frac{1}{8}$	2.50
$4\frac{1}{2}$ to $5\frac{1}{8}$	2.60

OVALS

Size, inch.....	Extra per 100 lbs.	Size, inch.....	Extra per 100 lbs.
$\frac{1}{4}$ to $1\frac{1}{2}$	\$.30	$\frac{1}{2}$ to $1\frac{1}{8}$	\$.60
$\frac{3}{8}$ to $1\frac{3}{8}$.....	.50	$1\frac{1}{2}$ to $2\frac{1}{8}$.....	.80

For intermediate sizes, the next higher extra to be charged in all cases.

LIGHT BARS AND BANDS

Size, inch.....	Extra per 100 lbs.
$1\frac{1}{2}$ to 6 x Nos. 7, 8, 9 and $\frac{1}{8}$	\$.40
$1\frac{1}{2}$ to 6 x Nos. 10, 11, 12 and $\frac{1}{8}$.....	.60
1 to $1\frac{1}{8}$ x Nos. 7, 8, 9 and $\frac{1}{8}$.....	.50
1 to $1\frac{1}{8}$ x Nos. 10, 11, 12 and $\frac{1}{8}$.....	.70
$1\frac{1}{8}$ to $1\frac{3}{8}$ x Nos. 7, 8, 9 and $\frac{1}{8}$.....	.70
$1\frac{1}{8}$ to $1\frac{3}{8}$ x Nos. 10, 11, 12 and $\frac{1}{8}$.....	.80
$1\frac{1}{8}$ and $\frac{3}{4}$ x Nos. 7, 8, 9 and $\frac{1}{8}$	1.00
$1\frac{1}{8}$ and $\frac{3}{4}$ x Nos. 10, 11, 12 and $\frac{1}{8}$	1.20
$1\frac{1}{8}$ and $\frac{5}{8}$ x Nos. 7, 8, 9 and $\frac{1}{8}$	1.20
$1\frac{1}{8}$ and $\frac{5}{8}$ x Nos. 10, 11, 12 and $\frac{1}{8}$	1.30
$1\frac{1}{2}$ x Nos. 7, 8, 9 and $\frac{1}{8}$	1.30
$1\frac{1}{2}$ x Nos. 10, 11, 12 and $\frac{1}{8}$	1.50
$1\frac{1}{8}$ x.....	1.80
$1\frac{1}{8}$ x Nos. 10, 11, 12 and $\frac{1}{8}$	2.10
$1\frac{1}{8}$ x Nos. 7, 8, 9 and $\frac{1}{8}$	1.90
$1\frac{1}{8}$ x Nos. 10, 11, 12 and $\frac{1}{8}$	2.40

For intermediate sizes, the next higher extra to be charged in all cases.

FLAT BARS AND HEAVY BANDS

Size, inch.....	Extra per 100 lbs.
1 to 6 x $\frac{3}{8}$ to 1.....	Base
1 to 6 x $\frac{1}{4}$ to $\frac{1}{8}$	\$.20
$1\frac{1}{8}$ to $1\frac{3}{8}$ x $\frac{3}{8}$ to $\frac{3}{4}$.....	.40
$1\frac{1}{8}$ to $1\frac{3}{8}$ x $\frac{1}{4}$ to $\frac{1}{8}$.....	.50
$1\frac{1}{8}$ to $1\frac{3}{8}$ x $\frac{3}{8}$ to $\frac{1}{2}$.....	.50
$1\frac{1}{8}$ to $1\frac{3}{8}$ x $\frac{1}{4}$ to $\frac{1}{8}$.....	.70
$1\frac{1}{2}$ to $2\frac{1}{8}$ x $\frac{3}{8}$ to $\frac{1}{8}$	1.00
$1\frac{1}{2}$ to $2\frac{1}{8}$ x $\frac{1}{4}$ to $\frac{1}{8}$	1.20
$1\frac{1}{2}$ to $2\frac{1}{8}$ x $\frac{1}{4}$ to $\frac{1}{8}$	2.00
$1\frac{1}{8}$ to 6 x $1\frac{1}{8}$ to $1\frac{3}{8}$.....	.10
$1\frac{1}{8}$ to 6 x $1\frac{1}{4}$ to $1\frac{1}{2}$.....	.20
$1\frac{3}{4}$ to 6 x $1\frac{5}{8}$ to 2.....	.30
$3\frac{1}{8}$ to 6 x $2\frac{1}{2}$.....	.40

For intermediate sizes, the next higher extra to be charged in all cases.

Above extras not applicable on Steel Tires.

SPRING STEEL

CLASSIFICATION. REVISED OCTOBER 1, 1909

ROUND AND SQUARE

Size, inch.....	Extra per 100 lbs.
$\frac{1}{4}$ to $1\frac{1}{8}$	\$1.50
$1\frac{1}{2}$ to $2\frac{1}{8}$	1.00
$2\frac{1}{2}$ to $3\frac{1}{8}$.....	.50
$3\frac{1}{2}$ to $4\frac{1}{8}$.....	.20
$4\frac{1}{2}$ to $5\frac{1}{8}$	Base

Base Price..... Per pound \$.....

FLAT

Size, inch.....	Extra per 100 lbs.
$\frac{1}{8}$ to $\frac{3}{8}$ x $\frac{3}{8}$ to $\frac{5}{8}$ Nos. 17 to 20.....	\$5.00
$\frac{1}{8}$ to $\frac{3}{8}$ x $\frac{3}{4}$ to 3 Nos. 17 to 20.....	2.20
$\frac{1}{8}$ to $\frac{3}{8}$ x $\frac{3}{8}$ to $\frac{5}{8}$ Nos. 10 to 16.....	4.00
$\frac{1}{8}$ to $\frac{1}{2}$ x $\frac{3}{4}$ to 3 Nos. 11 to 16.....	1.50
$\frac{1}{8}$ to $\frac{1}{2}$ x $\frac{3}{4}$ to 3 Nos. 8 to 10.....	1.00
$\frac{1}{8}$ to $\frac{1}{2}$ x $\frac{3}{8}$ to $\frac{1}{2}$ Nos. 1 to 7.....	1.00
$\frac{1}{8}$ to $\frac{1}{2}$ x $\frac{3}{4}$ to $\frac{1}{2}$ Nos. 1 to 7.....	.50
$\frac{1}{8}$ to $\frac{1}{2}$ x 1 to 3 Nos. 5 to 7.....	.50
$\frac{1}{4}$ to $\frac{1}{2}$ x 1 to $1\frac{1}{8}$ Nos. 1 to 4.....	.20
$\frac{1}{4}$ to $\frac{1}{2}$ x $1\frac{1}{4}$ to 6.....	Base

REFINED AND NORWAY IRON

NATIONAL IRON CLASSIFICATION.

ADOPTED MAY 1, 1905.

Base Sizes { Round and Square, 1 to 1½ in. } Per pound, \$....
 { Flat, ¾ to 1 x 1½ to 4 in. }

ROUNDS AND SQUARES

Size Inch.....	Extra per 100 lbs.
1 to 1½	Base
2 to 2½	\$.20
3 to 3½	.50
3½ to 4	.80
4½ to 4½	1.00
4½ to 5	1.30
5½ to 5	1.80
6½ to 6½	2.20
6½ to 7½	2.50
7½ to 7½	.10
7½ to 8	.20
8 to 8	.30
8 to 8½	.40
8½ to 8½	.50
8½ to 9	.70
9 to 9	.90
9 to 9½	1.40
9½ to 9½	2.50

OVAL IRON

Size inch.....	Extra per 100 lbs.
¾ to 1½	\$.40
¾ to 1½	.50
5/8 to 1½	.60
1½ to 1½	.80
3/8 to 1½	1.10
1½ to 1½ x 1½	1.00
5/8 to 1½ x 1½	1.20

HALF OVAL AND HALF ROUND

Size, inch.....	Extra per 100 lbs.
2½ to 3	\$.60
¾ to 2	.50
¾ to 1½	.70
5/8 to 1½	.90
1½ to 1½	1.20
3/8 to 1½	2.50
1½	3.50
1½	4.50

Half Oval less than ¼ their width in thickness, extra price.

FLATS

Size, inch.....						Extra per 100 lbs.	
1½ to 4	x	¾	to 1				Base
4½ to 6	x	¾	to 1			\$.10	
6½ to 8	x	¾	to 1½			.60	
8½ to 10	x	¾	to 1			.80	
1½ to 4	x	1½	to 1½			.30	
4½ to 6	x	1½	to 1½			.40	
2 to 4	x	1½	to 2			.50	
4½ to 6	x	1½	to 2			.60	
6½ to 8	x	1½	to 2			.80	
8½ to 10	x	1½	to 1½			.90	
8½ to 10	x	1½	to 2			1.00	
2 to 4	x	2½	to 3			.60	
4½ to 6	x	2½	to 3			.80	
6½ to 8	x	2½	to 3			1.00	
1½ to 1½	x	¾	to 1				
1 to 1½	x	¾	to ¾			.20	
¾ to 1½	x	¾	to ¾			.40	
5/8 to 1½	x	¾	to ¾			.50	
1½ to 1½	x	¾	to ½			.60	
8½ to 10	x	1¼	to 1¼			.70	
7 to 8	x	1¼	to 1¼			.80	
6½ to 6½	x	1¼	to 1¼			.90	
4½ to 6	x	1¼	to 1¼			1.00	
1½ to 4	x	1¼	to 1¼			1.10	
1 to 1½	x	1¼	to 1¼			1.20	
¾ to 1½	x	1¼	to 1¼			1.30	
5/8 to 1½	x	1¼	to 1¼			1.40	
1½ to 1½	x	1¼	to 1¼			1.50	
4½ to 6	x	1¼	to 1¼			1.60	
1½ to 4	x	1¼	to 1¼			1.70	
1 to 1½	x	1¼	to 1¼			1.80	
¾ to 1½	x	1¼	to 1¼			1.90	
5/8 to 1½	x	1¼	to 1¼			2.00	
1½ to 1½	x	1¼	to 1¼			2.10	
4½ to 6	x	1¼	to 1¼			2.20	
1½ to 4	x	1¼	to 1¼			2.30	
1 to 1½	x	1¼	to 1¼			2.40	
¾ to 1½	x	1¼	to 1¼			2.50	
5/8 to 1½	x	1¼	to 1¼			2.60	
1½ to 1½	x	1¼	to 1¼			2.70	
4½ to 6	x	1¼	to 1¼			2.80	
1½ to 4	x	1¼	to 1¼			2.90	
1 to 1½	x	1¼	to 1¼			3.00	
¾ to 1½	x	1¼	to 1¼			3.10	
5/8 to 1½	x	1¼	to 1¼			3.20	
1½ to 1½	x	1¼	to 1¼			3.30	
4½ to 6	x	1¼	to 1¼			3.40	
1½ to 4	x	1¼	to 1¼			3.50	
1 to 1½	x	1¼	to 1¼			3.60	
¾ to 1½	x	1¼	to 1¼			3.70	
5/8 to 1½	x	1¼	to 1¼			3.80	
1½ to 1½	x	1¼	to 1¼			3.90	
4½ to 6	x	1¼	to 1¼			4.00	
1½ to 4	x	1¼	to 1¼			4.10	
1 to 1½	x	1¼	to 1¼			4.20	
¾ to 1½	x	1¼	to 1¼			4.30	
5/8 to 1½	x	1¼	to 1¼			4.40	
1½ to 1½	x	1¼	to 1¼			4.50	
4½ to 6	x	1¼	to 1¼			4.60	
1½ to 4	x	1¼	to 1¼			4.70	
1 to 1½	x	1¼	to 1¼			4.80	
¾ to 1½	x	1¼	to 1¼			4.90	
5/8 to 1½	x	1¼	to 1¼			5.00	
1½ to 1½	x	1¼	to 1¼			5.10	
4½ to 6	x	1¼	to 1¼			5.20	
1½ to 4	x	1¼	to 1¼			5.30	
1 to 1½	x	1¼	to 1¼			5.40	
¾ to 1½	x	1¼	to 1¼			5.50	
5/8 to 1½	x	1¼	to 1¼			5.60	
1½ to 1½	x	1¼	to 1¼			5.70	
4½ to 6	x	1¼	to 1¼			5.80	
1½ to 4	x	1¼	to 1¼			5.90	
1 to 1½	x	1¼	to 1¼			6.00	
¾ to 1½	x	1¼	to 1¼			6.10	
5/8 to 1½	x	1¼	to 1¼			6.20	
1½ to 1½	x	1¼	to 1¼			6.30	
4½ to 6	x	1¼	to 1¼			6.40	
1½ to 4	x	1¼	to 1¼			6.50	
1 to 1½	x	1¼	to 1¼			6.60	
¾ to 1½	x	1¼	to 1¼			6.70	
5/8 to 1½	x	1¼	to 1¼			6.80	
1½ to 1½	x	1¼	to 1¼			6.90	
4½ to 6	x	1¼	to 1¼			7.00	
1½ to 4	x	1¼	to 1¼			7.10	
1 to 1½	x	1¼	to 1¼			7.20	
¾ to 1½	x	1¼	to 1¼			7.30	
5/8 to 1½	x	1¼	to 1¼			7.40	
1½ to 1½	x	1¼	to 1¼			7.50	
4½ to 6	x	1¼	to 1¼			7.60	
1½ to 4	x	1¼	to 1¼			7.70	
1 to 1½	x	1¼	to 1¼			7.80	
¾ to 1½	x	1¼	to 1¼			7.90	
5/8 to 1½	x	1¼	to 1¼			8.00	
1½ to 1½	x	1¼	to 1¼			8.10	
4½ to 6	x	1¼	to 1¼			8.20	
1½ to 4	x	1¼	to 1¼			8.30	
1 to 1½	x	1¼	to 1¼			8.40	
¾ to 1½	x	1¼	to 1¼			8.50	
5/8 to 1½	x	1¼	to 1¼			8.60	
1½ to 1½	x	1¼	to 1¼			8.70	
4½ to 6	x	1¼	to 1¼			8.80	
1½ to 4	x	1¼	to 1¼			8.90	
1 to 1½	x	1¼	to 1¼			9.00	
¾ to 1½	x	1¼	to 1¼			9.10	
5/8 to 1½	x	1¼	to 1¼			9.20	
1½ to 1½	x	1¼	to 1¼			9.30	
4½ to 6	x	1¼	to 1¼			9.40	
1½ to 4	x	1¼	to 1¼			9.50	
1 to 1½	x	1¼	to 1¼			9.60	
¾ to 1½	x	1¼	to 1¼			9.70	
5/8 to 1½	x	1¼	to 1¼			9.80	
1½ to 1½	x	1¼	to 1¼			9.90	
4½ to 6	x	1¼	to 1¼			10.00	
1½ to 4	x	1¼	to 1¼			10.10	
1 to 1½	x	1¼	to 1¼			10.20	
¾ to 1½	x	1¼	to 1¼			10.30	
5/8 to 1½	x	1¼	to 1¼			10.40	
1½ to 1½	x	1¼	to 1¼			10.50	
4½ to 6	x	1¼	to 1¼			10.60	
1½ to 4	x	1¼	to 1¼			10.70	
1 to 1½	x	1¼	to 1¼			10.80	
¾ to 1½	x	1¼	to 1¼			10.90	
5/8 to 1½	x	1¼	to 1¼			11.00	
1½ to 1½	x	1¼	to 1¼			11.10	
4½ to 6	x	1¼	to 1¼			11.20	
1½ to 4	x	1¼	to 1¼			11.30	
1 to 1½	x	1¼	to 1¼			11.40	
¾ to 1½	x	1¼	to 1¼			11.50	
5/8 to 1½	x	1¼	to 1¼			11.60	
1½ to 1½	x	1¼	to 1¼			11.70	
4½ to 6	x	1¼	to 1¼			11.80	
1½ to 4	x	1¼	to 1¼			11.90	
1 to 1½	x	1¼	to 1¼			12.00	
¾ to 1½	x	1¼	to 1¼			12.10	
5/8 to 1½	x	1¼	to 1¼			12.20	
1½ to 1½	x	1¼	to 1¼			12.30	
4½ to 6	x	1¼	to 1¼			12.40	
1½ to 4	x	1¼	to 1¼			12.50	
1 to 1½	x	1¼	to 1¼			12.60	
¾ to 1½	x	1¼	to 1¼			12.70	
5/8 to 1½	x	1¼	to 1¼			12.80	
1½ to 1½	x	1¼	to 1¼			12.90	
4½ to 6	x	1¼	to 1¼			13.00	
1½ to 4	x	1¼	to 1¼			13.10	
1 to 1½	x	1¼	to 1¼			13.20	
¾ to 1½	x	1¼	to 1¼			13.30	
5/8 to 1½	x	1¼	to 1¼			13.40	
1½ to 1½	x	1¼	to 1¼			13.50	
4½ to 6	x	1¼	to 1¼			13.60	
1½ to 4	x	1¼	to 1¼			13.70	
1 to 1½	x	1¼	to 1¼			13.80	
¾ to 1½	x	1¼	to 1¼			13.90	
5/8 to 1½	x	1¼	to 1¼			14.00	
1½ to 1½	x	1¼	to 1¼			14.10	
4½ to 6	x	1¼	to 1¼			14.20	
1½ to 4	x	1¼	to 1¼			14.30	
1 to 1½	x	1¼	to 1¼			14.40	
¾ to 1½	x	1¼	to 1¼			14.50	
5/8 to 1½	x	1¼	to 1¼			14.60	
1½ to 1½	x	1¼	to 1¼			14.70	
4½ to 6	x	1¼	to 1¼			14.80	
1½ to 4	x	1¼	to 1¼			14.90	
1 to 1½	x	1¼	to 1¼			15.00	
¾ to 1½	x	1¼	to 1¼			15.10	
5/8 to 1½	x	1¼	to 1¼			15.20	
1½ to 1½	x	1¼	to 1¼			15.30	
4½ to 6	x	1¼	to 1¼			15.40	
1½ to 4	x	1¼	to 1¼			15.50	
1 to 1½	x	1¼	to 1¼			15.60	
¾ to 1½	x	1¼	to 1¼			15.70	
5/8 to 1½	x	1¼	to 1¼			15.80	
1½ to 1½	x	1¼	to 1¼			15.90	
4½ to 6	x	1¼	to 1¼			16.00	
1½ to 4	x	1¼	to 1¼			16.10	
1 to 1½	x	1¼	to 1¼			16.20	
¾ to 1½	x	1¼	to 1¼			16.30	
5/8 to 1½	x	1¼	to 1¼			16.40	
1½ to 1½	x	1¼	to 1¼			16.50	
4½ to 6	x	1¼	to 1¼			16.60	
1½ to 4	x	1¼	to 1¼			16.70	
1 to 1½	x	1¼	to 1¼			16.80	
¾ to 1½	x	1¼	to 1¼			16.90	
5/8 to 1½	x	1¼	to 1¼			17.00	
1½ to 1½	x	1¼	to 1¼			17.10	
4½ to 6	x	1¼	to 1¼			17.20	
1½ to 4	x	1¼	to 1¼			17.30	
1 to 1½	x	1¼	to 1¼			17.40	
¾ to 1½	x	1¼	to 1¼			17.50	
5/8 to 1½	x	1¼	to 1¼			17.60	
1½ to 1½	x	1¼	to 1¼			17.70	
4½ to 6	x	1¼	to 1¼			17.80	
1½ to 4	x	1¼	to 1¼			17.90	
1 to 1½	x	1¼	to 1¼			18.00	
¾ to 1½	x	1¼	to 1¼			18.10	
5/8 to 1½	x	1¼	to 1¼			18.20	
1½ to 1½	x	1¼	to 1¼			18.30	
4½ to 6	x	1¼	to 1¼			18.40	
1½ to 4	x	1¼	to 1¼			18.50	
1 to 1½	x	1¼	to 1¼			18.60	
¾ to 1½	x	1¼	to 1¼			18.70	
5/8 to 1½	x	1¼	to 1¼			18.80	
1½ to 1½	x	1¼	to 1¼			18.90	
4½ to 6	x	1¼	to 1¼			19.00	
1½ to 4	x	1¼	to 1¼			19.10	
1 to 1½	x	1¼	to 1¼			19.20	
¾ to 1½	x	1¼	to 1¼			19.30	
5/8 to 1½	x	1¼	to 1¼			19.40	
1½ to 1½	x	1¼	to 1¼			19.50	
4½ to 6	x	1¼	to 1¼			19.60	
1½ to 4	x	1¼	to 1¼			19.70	
1 to 1½	x	1¼	to 1¼			19.80	
¾ to 1½	x	1¼	to 1¼			19.90	
5/8 to 1½	x	1¼	to 1¼			20.00	
1½ to 1½	x	1¼	to 1¼			20.10	
4½ to 6	x	1¼	to 1¼			20.20	
1½ to 4	x	1¼	to 1¼			20.30	
1 to 1½	x	1¼	to 1¼			20.40	
¾ to 1½	x	1¼	to 1¼				

BLUE ANNEALED SHEETS



FIG. 2034

Rolled from prime Open Hearth Stock, well annealed and leveled. Also furnished in Portsmouth Iron and Ohio Metal.

EXTREME SIZES AND GAUGES

Gauge	Width in Inches												Diameter Circles
	64	62	60	58	56	54	50	48	42	36	30	24	
	Length in Inches												
3	144	144	144	144	144	156	156	168	180	204	144	168	64
4	144	144	144	144	144	156	156	168	180	204	144	168	64
5	144	144	144	144	144	156	156	168	180	204	144	168	64
6	144	144	156	168	168	180	180	192	192	216	156	192	64
7	144	156	168	180	192	216	240	240	240	240	168	240	64
8	144	156	192	192	192	240	240	240	240	240	192	240	64
9	144	156	192	192	192	240	240	240	240	240	192	240	64
10	144	156	192	192	192	240	240	240	240	240	192	240	64
11	144	156	180	180	192	216	240	240	240	240	180	240	64
12	144	144	168	168	180	192	240	240	240	240	168	240	64
14	...	...	...	...	...	168	168	180	180	192	192	180	54
16	...	...	...	...	...	156	156	156	168	168	168	156	54
18	...	...	...	...	...	...	144	144	144	144	144	144	50

Also furnished in steel of any analysis. Submit complete specifications for quotations.

UNITED STATES STANDARD GAUGE FOR SHEET AND PLATE IRON AND STEEL ADOPTED JULY 1, 1893

No. of Gauge	Approximate thickness in fractions of an inch	Approximate thickness in decimal parts of an inch	Weight per sq. foot in ozs. avoirdupois	Weight per square ft. in lbs. avoirdupois, Iron	No. of Gauge	Approximate thickness in fractions of an inch	Approximate thickness in decimal parts of an inch	Weight per sq. foot in ozs. avoirdupois	Weight per square ft. in lbs. avoirdupois, Iron
0000000	1-2	.5	320	20.	16	1-16	.0625	40	2.5
000000	15-32	.46875	300	18.75	17	9-160	.05625	36	2.25
00000	7-16	.4375	280	17.5	18	1-20	.05	32	2.
0000	13-32	.40625	260	16.25	19	7-160	.04375	28	1.75
000	3-8	.375	240	15.	20	3-80	.0375	24	1.5
00	11-32	.34375	220	13.75	21	11-320	.034375	22	1.375
0	5-16	.3125	200	12.5	22	1-32	.03125	20	1.25
1	9-32	.28125	180	11.25	23	9-320	.028125	18	1.125
2	17-64	.265625	170	10.625	24	1-40	.025	16	1.
3	1-4	.25	160	10.	25	7-320	.021875	14	.875
4	15-64	.234375	150	9.375	26	3-160	.01875	12	.75
5	7-32	.21875	140	8.75	27	11-640	.0171875	11	.6875
6	13-64	.203125	130	8.125	28	1-64	.015625	10	.625
7	3-16	.1875	120	7.5	29	9-640	.0140625	9	.5625
8	11-64	.171875	110	6.875	30	1-80	.0125	8	.5
9	5-32	.15625	100	6.25	31	7-640	.0109375	7	.4375
10	9-64	.140625	90	5.625	32	13-1280	.0105625	6½	.40625
11	1-8	.125	80	5.	33	3-320	.009375	6	.375
12	7-64	.109375	70	4.375	34	11-1280	.00859375	5½	.34375
13	3-32	.09375	60	3.75	35	5-640	.0078125	5	.3125
14	5-64	.078125	50	3.125	36	9-1280	.00703125	4½	.28125
15	9-128	.0703125	45	2.8125	37	17-2560	.006640625	4¼	.265625
					38	1-160	.00625	4	.25

Authorized by an act of Congress July 1, 1893 to provide a basis used in determining Duties and Taxes levied by the United States on sheet and plate iron and steel. (For weights of steel, add two percent.)

GALVANIZED SHEETS

GAUGES AND WEIGHTS



FIG. 2035

Body—One Pass cold rolled box annealed, Open Hearth Steel, Portsmouth Iron or Ohio Metal, Well coated, clean flat roller leveled sheets, soft and true to gauge. Portsmouth Iron and Ohio Metal galvanized sheets No. 12 to 29 gauge inclusive.

Gauge No.	Ounces per Sq. Ft.	Pounds per Sq. Ft.	Pounds Per Sq.	Gauge No.	Ounces per Sq. Ft.	Pounds per Sq. Ft.	Pounds per Sq.
14	52 $\frac{1}{2}$	3.281	328.1	26	14 $\frac{1}{2}$	.906	90.6
16	42 $\frac{1}{2}$	2.656	265.6	27	13 $\frac{1}{2}$	.8437	84.37
18	34 $\frac{1}{2}$	2.156	215.6	28	12 $\frac{1}{2}$	.7812	78.12
20	26 $\frac{1}{2}$	1.656	165.6	29	11 $\frac{1}{2}$	.7187	71.87
22	22 $\frac{1}{2}$	1.406	140.6	30	10 $\frac{1}{2}$	.6562	65.62
24	18 $\frac{1}{2}$	1.156	115.6	....	.....	.....	.....

STANDARD SIZES

Gauges Nos. 12 to 30, inclusive, 24, 26, 28 and 30 inches wide by 72, 84, 96 and 120 inches long. Gauges Nos. 14 to 28, inclusive, 36 in. wide by 96 in. and 120 in. long.

CORRUGATED SHEETS

Made from prime Open Hearth Stock, Portsmouth Iron or Ohio Metal, galvanized, black or painted red.

Furnished with 3, 2 $\frac{1}{2}$, 2, 1 $\frac{1}{4}$ and $\frac{1}{2}$ inch corrugations.

We also furnish sheets corrugated especially for the manufacture of corrugated culverts, in 10, 12, 14, 16, and 18 gauge, which will fit all standard curving rolls.

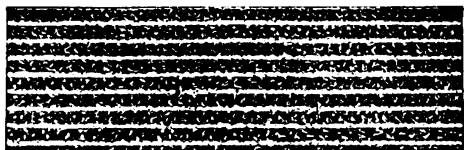


FIG. 2036

3-INCH CORRUGATED ROOFING AND SIDING
GALVANIZED OR PAINTED

16 gauge and lighter. Corrugations $\frac{3}{8}$ inch deep, 26 inches wide with both corrugations down. Standard lengths are 5, 6, 7, 8, 9 and 10 feet. Used largely for heavy structural work or very large roofs, and standard for export.

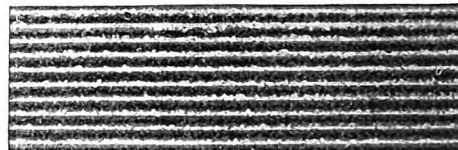
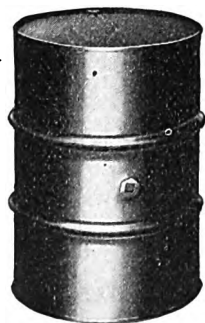


FIG. 2037

2 $\frac{1}{2}$ -INCH CORRUGATED ROOFING AND SIDING
GALVANIZED OR PAINTED

16 gauge and lighter. Corrugations are $\frac{1}{2}$ inch deep. Can make as deep as $\frac{5}{8}$ inch. Can corrugate Special Orders as heavy as No. 10 gauge. 26 inches wide, both corrugations down. Standard lengths are 5, 6, 7, 8, 9, 10 and 12 feet.

STEEL BARRELS



NO. B055—FIG. 2038

These barrels or drums are furnished in standard sizes of 15, 30, 55 and 110 gallon (U. S. Liquid Measure) capacities, suitable for all foreign or domestic shipment of acids, oils and various other liquids.

All I. C. C. drums conform to the requirements and regulations of Specification No. 5 issued by the Interstate Commerce Commission of the United States.

These Barrels and Drums are made from heavy gauge steel sheets, welded throughout or with heads double seamed to bodies; with or without heavy chime hoops; with rolling hoops swedged out of the shells or with separate formed sheet metal rolling hoops shrunk on bodies. The most practical styles of coatings are available to the steel drum user in the above types.



NO. B0155—FIG. 2039

Black, Painted or Galvanized with Reinforced Chimes. Rolling hoops pressed from shell. Heads double seamed or welded throughout. Heavier gauges furnished as ordered. This type conforms to I. C. C. regulations.

	Black	Galvanize
Capacity in gallons.....	55	55
Numbers (bung and vent in head)....	055	0155
Numbers (bung in shell, vent in head)...	B055	B0155
Gauge used throughout.....	16	16
Average weight in pounds.....	83	90

BULL DOG MINING AND ROCK DRILL STEEL

HOLLOW

ROUND, HEXAGON, OCTAGON, AND QUARTER OCTAGON

SOLID

CRUCIFORM, ROUND, HEXAGON, OCTAGON AND QUARTER OCTAGON

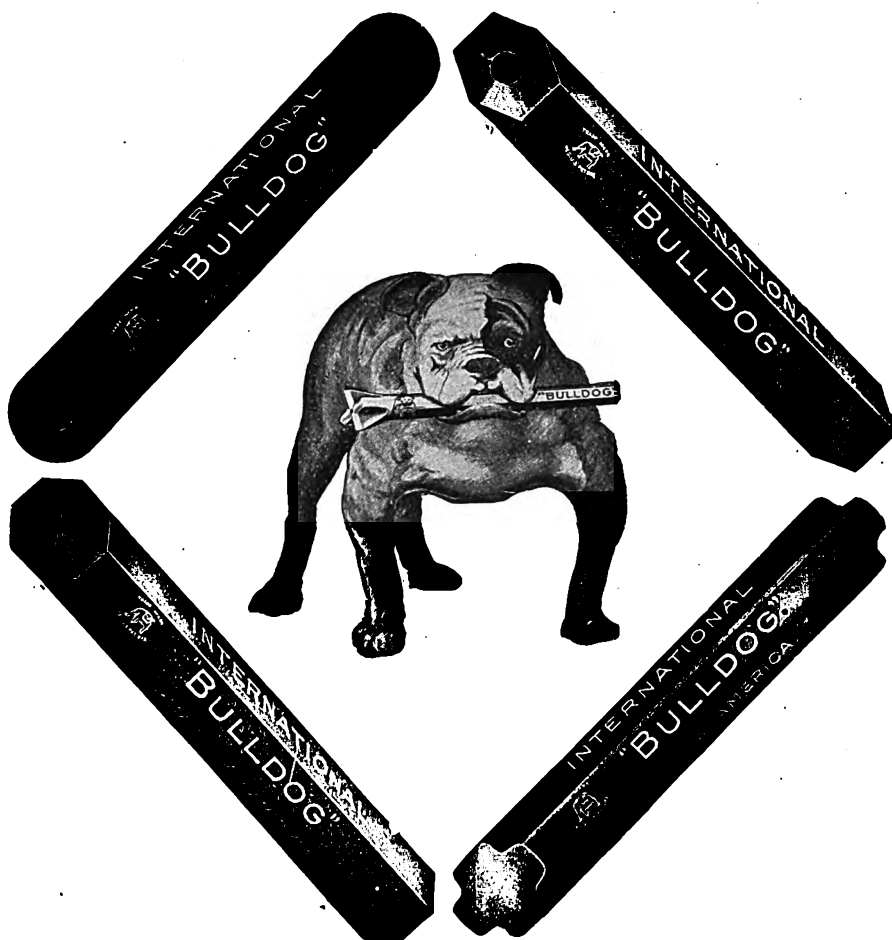
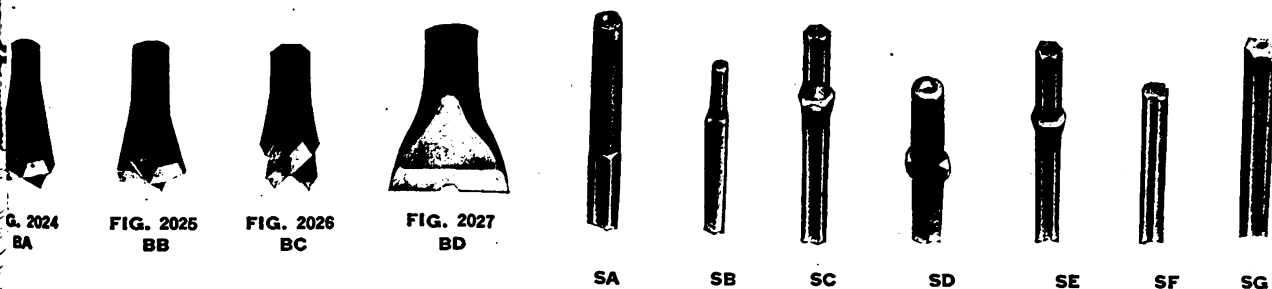


FIG. 2023

MADE-UP DRILLS A SPECIALTY IN ALL SIZES AND SECTIONS — HOLLOW AND SOLID

Complete with Bits, Collars and Shanks; and with either Star (4 point) or Rose (6 point) Bits. Steels with Special Sized Bits can be furnished on short notice.

VARIETY OF BITS AND SHANKS THAT CAN BE FORGED ON VARIOUS STEEL SECTIONS.



BA—Standard "+" Straight Face Bit.
BB—"X" Bit with Straight Face.

BB—Convex or High Center "+" Bit.
BD—"Bull" or Chisel Bit on Hollow Steel.

FIG. 2028

BULLDOG MINING AND ROCK DRILL STEEL

DIRECTIONS FOR TREATMENT OF "BULLDOG" SOLID AND HOLLOW DRILL STEEL

FORGING

The heating must be done very carefully. If the steel is heated too highly it will become coarse grained and brittle, and cannot be restored. The steel should not be heated to more than **LIGHT YELLOW** and at this heat it must be taken out of the fire and worked at once. This applies particularly to tools in which a considerable change in shape from that of the original bar is required, and at this heat the steel should be worked thoroughly. Where there is not much forging to be done, less heat should be used; but it must be observed always that hammering must be continued until the steel takes on a **DULL RED** or **BROWN COLOR** so that the grain will be close and fine. Excellent results are obtained by reheating the parts that have been forged to a cherry heat and allowing to cool slowly; this eliminates the strains created by forging.

HARDENING

The steel should be heated slowly and evenly, and only that part which is to be hardened should be heated, and then only to a **DULL RED**. Much better results will be obtained if steel is quenched on a raising heat. A soaking heat does not improve steel if it is heated for hardening beyond the point intended. Cooling back to the point intended and then quenching does not change the effect. Harden in water at a temperature of 75 to 85 degrees Fahr. The cutting edge of the steel should be submerged to a depth of only about $\frac{3}{4}$ ". The neck of the tool should be submerged to a depth of $1\frac{1}{4}$ "; but where

the neck is upset, the steel should be hardened to a point about an inch below the upset part. When the tool is thoroughly hardened, it should be taken out of the water and rapidly cleaned and tempered.

TEMPERING

It is impossible to give absolute rules for tempering the cutting edge of a drill steel. Broadly speaking, the temper must be suited to the hardness of the rock and a careful study of the power of resistance of the steel in working will soon indicate what temper is most desirable. "Bulldog" will generally give the best results if tempered to a dark yellow, but this must not be taken as a definite rule. After tempering the tool should be placed cutting edge or point down in a vessel holding a depth of from $\frac{1}{4}$ " to $\frac{1}{2}$ " water, and the steel should be left there until entirely cooled.

TEMPERING THE NECK OR COLLAR

The neck or collar must be tempered—or drawn—considerably more than the cutting edge. The very end or tip of the steel should be hardest, and the rest should be tempered down gradually until it runs into the unhardened body of the tool.

The cooling may be done in water, as with the cutting edge, but in treating "Bulldog" it will be found that the best results are obtained by allowing the steel to cool off in the natural air. When the neck or collar is cooled off in water the utmost caution should be used, and the cooling must be done very slowly. At all permissible let it cool off in the air at ordinary temperature.

WEIGHT OF HOLLOW DRILL STEEL—PER FOOT

Size	Hexagon	Round	Cruciform	Octagon	Quarter-Octagon
$\frac{5}{8}$	.97	.85	.....	.90	1.10
$\frac{3}{4}$	1.50	1.30	1.18	1.40	1.63
$\frac{7}{8}$	2.05	1.85	1.50	1.90	2.28
1	2.75	2.45	2.05	2.60	3.03
$1\frac{1}{8}$	3.50	3.15	2.60	3.30	3.88
$1\frac{1}{4}$	4.40	3.90	3.25	4.10	4.88
$1\frac{3}{8}$	5.30	4.75	3.80	5.00	5.90
$1\frac{1}{2}$	6.30	5.75	4.60	6.00	7.05
$1\frac{3}{4}$	7.50	6.75	5.30	7.10	8.30
$1\frac{7}{8}$	8.75	8.00	6.00	8.35	9.60
$2\frac{1}{8}$	10.00	9.20	6.80	9.60	11.00
2	11.50	10.40	7.75	11.00	12.60

The size of the hole varies according to the size of the bar of Steel.

Ordinarily the hole is $\frac{1}{8}$ " for $\frac{5}{8}$ " and $\frac{3}{4}$ ", $\frac{1}{4}$ " for $\frac{7}{8}$ ", $\frac{3}{8}$ " for 1" and $1\frac{1}{8}$ ", $\frac{1}{2}$ " for $1\frac{1}{4}$ " to $1\frac{1}{2}$ ", and so on.

But the sizes can be changed to suit specifications.

WEIGHT OF SOLID DRILL STEEL—PER FOOT

Size	Octagon	Hexagon	Cruciform Rocky Mountain	Quarter- Octagon	Round
$\frac{5}{8}$	1.10	1.15	.....	1.25	1.04
$\frac{3}{4}$	1.58	1.66	1.35	1.80	1.50
$\frac{7}{8}$	2.16	2.25	1.70	2.45	2.04
1	2.82	2.94	2.20	3.20	2.67
$1\frac{1}{8}$	3.57	3.73	2.80	4.05	3.36
$1\frac{1}{4}$	4.40	4.60	3.35	5.05	4.17
$1\frac{3}{8}$	5.33	5.57	4.02	6.10	5.04
$1\frac{1}{2}$	6.35	6.62	4.75	7.25	6.00
$1\frac{3}{4}$	7.45	7.76	5.50	8.50	7.05
$1\frac{7}{8}$	8.64	9.00	6.25	9.80	8.17
$2\frac{1}{8}$	9.91	10.32	7.10	11.30	9.36
2	11.29	11.76	8.00	12.90	10.61
$2\frac{1}{4}$	14.29	14.90	9.75	16.35	13.55
$2\frac{1}{2}$	17.64	18.48	11.55	20.20	16.64

DRILL STEELS FOR PISTON DRILLS

SOLID OCTAGON OR ROUND STEEL SHANK

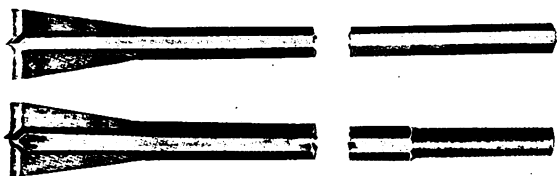


FIG. 2032

Length of each steel not including shank.	Dia. of Stand-ard Bit	Size of Steel	Approx. Weight		Price	
			Each Steel Lbs.	Set Lbs.	Each Steel	Per Set

SHANK 3/4 X 5", FEED 15 INCHES

Feet	Inch.					
1	3	1 1/2	3/4	3	..	.....
2	6	1 5/8	3/4	5	8	.....
3	9	1 3/4	3/4	7	15	.....
5		1 7/8	3/4	9	24	.....
6	3	1 7/8	3/4	11	35	.....
7	6	1 7/8	3/4	14	49	.....
8	9	1 7/8	3/4	18	67	.....
10		1 7/8	3/4	23	90	.....

SHANK 1/2 X 5", FEED 15 INCHES

1	3	1 1/4	7/8	4	..	.....
2	6	1 5/8	7/8	7	11	.....
3	9	1 1/2	7/8	9	20	.....
5		1 3/8	7/8	12	32	.....
6	3	1 1/4	7/8	14	46	.....
7	6	1 1/4	7/8	16	62	.....
8	9	1 1/4	7/8	18	80	.....
10		1 1/4	7/8	23	103	.....

SHANK 1 X 5 1/2", FEED 24 INCHES

2		2 1/4	1 1/8	10	..	.....
4		2 1/8	1 1/8	17	27	.....
6		2	1	20	47	.....
8		1 7/8	1	25	72	.....
10		1 3/4	1	29	101	.....
12		1 5/8	1	36	137	.....
14		1 1/2	1	42	179	.....
16		1 1/8	1	48	227	.....
18		1 1/2	1	60	287	.....
20		1 1/2	1	70	357	.....
22		1 1/8	1	75	432	.....
24		1 1/2	1	85	517	.....

Length of each steel not including shank	Dia. of Stand-ard Bit	Size of Steel	Approx. Weight		Price	
			Each Steel Lbs.	Set Lbs.	Each Steel	Per Set

SHANK 3/8 X 5", FEED 20 INCHES

Feet	Inch.					
1	8	1 3/4	1	6	..	.....
3	4	1 5/8	1	11	17	.....
5		1 1/2	7/8	13	30	.....
6	8	1 3/8	7/8	16	46	.....
8	4	1 1/4	7/8	20	66	.....
10		1 1/4	7/8	23	89	.....
11	8	1 1/4	7/8	29	118	.....

SHANK 1 1/8 X 6", FEED 24 INCHES

2		2 1/2	1 1/4	12	..	.....
4		2 3/8	1 1/4	20	32	.....
6		2 1/4	1 1/8	24	56	.....
8		2 1/8	1 1/8	31	87	.....
10		2	1 1/8	40	127	.....
12		1 7/8	1 1/8	49	176	.....
14		1 3/4	1 1/8	53	229	.....
16		1 5/8	1 1/8	63	292	.....
18		1 5/8	1 1/8	76	368	.....
20		1 5/8	1 1/8	82	450	.....
22		1 5/8	1 1/8	88	538	.....
24		1 5/8	1 1/8	95	633	.....
26		1 5/8	1 1/8	105	738	.....
28		1 5/8	1 1/8	117	855	.....
30		1 5/8	1 1/8	130	985	.....

SHANK 1 1/4 X 6", FEED 24 INCHES

2		2 5/8	1 3/8	14	..	.....
4		2 1/2	1 3/8	24	38	.....
6		2 3/8	1 1/4	30	68	.....
8		2 1/4	1 1/4	38	106	.....
10		2 1/8	1 1/4	49	155	.....
12		2	1 1/4	57	212	.....
14		1 7/8	1 1/4	68	280	.....
16		1 3/4	1 1/4	75	355	.....
18		1 3/4	1 1/4	85	440	.....
20		1 3/4	1 1/4	96	536	.....
22		1 3/4	1 1/4	105	641	.....
24		1 3/4	1 1/4	115	756	.....
26		1 3/4	1 1/4	125	881	.....
28		1 3/4	1 1/4	140	1021	.....
30		1 3/4	1 1/4	155	1176	.....
32		1 3/4	1 1/4	165	1341	.....

STAR DRILLS FOR HAND DRILLING

FOUR POINT

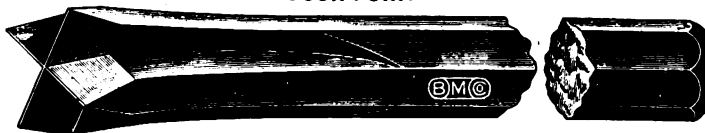


FIG. 2033

For drilling in stone, brick, concrete, etc. Made from the very best grade octagon hammered tool steel.

PRICE PER DOZEN

Size of Bit, ins.	1/4	5/16	3/8	7/16	1/2	5/8	3/4	1	1 1/8	1 1/4	1 3/8	1 1/2	1 3/4	2	2 1/4	2 1/2
Length inches																
8	\$ 8.25	\$ 8.25	\$ 8.25	\$ 8.70	\$ 9.65	\$11.65	\$15.30	\$17.00	.....	.....	.....	.....	.....	.....	.....	.....
12	8.50	8.50	8.50	9.00	10.00	12.00	16.00	18.00	\$24.00	\$30.00	\$40.00	\$50.00	\$75.00	\$105.00	\$135.00	\$165.00
18	11.00	11.00	11.00	11.50	12.50	15.00	20.00	22.50	28.00	35.00	45.00	56.00	81.00	112.00	145.00	175.00
24	13.50	13.50	13.50	14.00	15.00	17.50	22.50	25.00	32.00	40.00	50.00	62.00	87.00	120.00	165.00	195.00

DRILL STEELS FOR HAMMER DRILLS



FIG. 2029

½-IN. HOLLOW HEXAGON OR QUARTER OCTAGON
WITH BITS (4 POINT ROSE OR BULL)
WITH COLLARS AND ¼" HEXAGON SHANKS ¾" LONG

Drilling Length exclusive of length in chuck, Inches	Diam. of Bit Inches Rose & Bull	Approx Weight per Steel Lbs.	PRICE	
			Each Steel	Per Set
STANDARD 12-INCH RUN				
6-FOOT SET				
12	1 $\frac{3}{4}$	3	.....	.....
24	1 $\frac{5}{8}$	5	.....	.....
36	1 $\frac{1}{2}$	7	.....	.....
48	1 $\frac{3}{8}$	10	.....	.....
60	1 $\frac{1}{4}$	12	.....	.....
72	1 $\frac{1}{8}$	14	.....	.....
9-FOOT SET				
12	2 $\frac{1}{8}$	3	.....	.....
24	2	5	.....	.....
36	1 $\frac{7}{8}$	7	.....	.....
48	1 $\frac{3}{4}$	10	.....	.....
60	1 $\frac{5}{8}$	12	.....	.....
72	1 $\frac{1}{2}$	14	.....	.....
84	1 $\frac{3}{8}$	16	.....	.....
96	1 $\frac{1}{4}$	18	.....	.....
108	1 $\frac{1}{8}$	20	.....	.....
12-FOOT SET				
12	2 $\frac{1}{2}$	3	.....	.....
24	2 $\frac{3}{8}$	5	.....	.....
36	2 $\frac{1}{4}$	7	.....	.....
48	2 $\frac{1}{8}$	10	.....	.....
60	2	12	.....	.....
72	1 $\frac{7}{8}$	14	.....	.....
84	1 $\frac{3}{4}$	16	.....	.....
96	1 $\frac{5}{8}$	18	.....	.....
108	1 $\frac{1}{2}$	20	.....	.....
120	1 $\frac{3}{8}$	22	.....	.....
132	1 $\frac{1}{4}$	25	.....	.....
144	1 $\frac{1}{8}$	27	.....	.....

WATER DRILL STEELS

WITH SHANK AND HOLDING LUGS



FIG. 2030

Length of each steel not inc. shank	Diam. of Bit, Inches	Approx. Weight Each Steel Lbs.	PRICE	
			Each Steel	Per Set
1$\frac{1}{8}$ INCH HOLLOW ROUND				
2'0"	1 $\frac{7}{8}$	8	.....	.....
4'0"	1 $\frac{3}{4}$	14	.....	.....
6'0"	1 $\frac{5}{8}$	21	.....	.....
8'0"	1 $\frac{1}{2}$	27	.....	.....
10'0"	1 $\frac{3}{8}$	33	.....	.....
12'0"	1 $\frac{1}{4}$	39	.....	.....
1$\frac{1}{4}$ INCH HOLLOW ROUND				
2'0"	2	10	.....	.....
4'0"	1 $\frac{7}{8}$	18	.....	.....
6'0"	1 $\frac{3}{4}$	25	.....	.....
8'0"	1 $\frac{5}{8}$	33	.....	.....
10'0"	1 $\frac{1}{2}$	41	.....	.....
12'0"	1 $\frac{3}{8}$	49	.....	.....

1-IN. HOLLOW HEXAGON
WITH BITS (4 POINT CROSS OF BULL)
WITH COLLARS AND SHANKS

Drilling Length exclusive of length in chuck, Inches	Diam of Bit Inches Rose & Bull	Approx Weight per Steel Lbs.	PRICE	
			Each Steel	Per Set
STANDARD 18-INCH RUN 6-FOOT SET				
18	1 $\frac{5}{8}$	5	.....	.....
36	1 $\frac{1}{2}$	9	.....	.....
54	1 $\frac{3}{8}$	13	.....	.....
72	1 $\frac{1}{4}$	16	.....	.....
9-FOOT SET				
18	1 $\frac{7}{8}$	5	.....	.....
36	1 $\frac{3}{4}$	9	.....	.....
54	1 $\frac{5}{8}$	13	.....	.....
72	1 $\frac{1}{2}$	16	.....	.....
90	1 $\frac{3}{8}$	20	.....	.....
108	1 $\frac{1}{4}$	24	.....	.....
12-FOOT SET				
18	2 $\frac{1}{8}$	5	.....	.....
36	2	9	.....	.....
54	1 $\frac{7}{8}$	13	.....	.....
72	1 $\frac{3}{4}$	16	.....	.....
90	1 $\frac{5}{8}$	20	.....	.....
108	1 $\frac{1}{2}$	24	.....	.....
126	1 $\frac{3}{8}$	28	.....	.....
144	1 $\frac{1}{4}$	31	.....	.....

Special bits and lengths as well as other steel sections can be supplied.

STOPPING DRILL STEELS

FOUR POINT CROSS BIT OR FOUR POINT HIGH CENTER BIT—COLLAR



FIG. 2031

Length Inches	Diam. of Bit Inches.	Approx Weight Per Steel Lbs.	PRICE	
			Each Steel	Per Set
1 INCH CRUCIFORM STEEL				
12	1 $\frac{3}{4}$	3	.....	.....
24	1 $\frac{5}{8}$	6	.....	.....
36	1 $\frac{1}{2}$	8	.....	.....
48	1 $\frac{3}{8}$	11	.....	.....
60	1 $\frac{1}{4}$	13	.....	.....
72	1 $\frac{1}{8}$	16	.....	.....
1 $\frac{1}{8}$ INCH CRUCIFORM STEEL				
12	1 $\frac{13}{16}$	4	.....	.....
24	1 $\frac{13}{16}$	7	.....	.....
36	1 $\frac{11}{16}$	10	.....	.....
48	1 $\frac{9}{16}$	13	.....	.....
60	1 $\frac{7}{16}$	17	.....	.....
72	1 $\frac{5}{16}$	20	.....	.....
1 $\frac{1}{4}$ INCH CRUCIFORM STEEL				
12	2 $\frac{1}{16}$	5	.....	.....
24	1 $\frac{13}{16}$	8	.....	.....
36	1 $\frac{11}{16}$	12	.....	.....
48	1 $\frac{11}{16}$	15	.....	.....
60	1 $\frac{9}{16}$	19	.....	.....
72	1 $\frac{7}{16}$	22	.....	.....

WYOMING "RED EDGE" SHOVELS

DIFFERENT AND BETTER THAN ANY OTHER SHOVEL ON THE MARKET

MADE OF CHROME NICKEL STEEL

SELECTED NORTHERN WHITE ASH HANDLES

PUT TOGETHER TO STAY TOGETHER

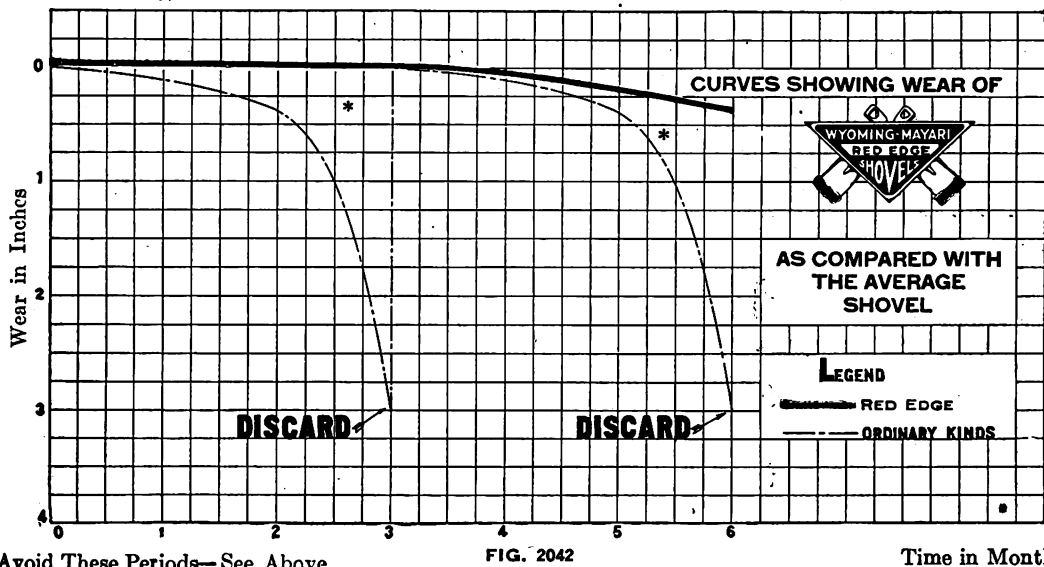
Wyoming RED EDGE Shovels are made of Chrome nickel steel, the same steel that is used in automobile crankshafts; the highest steel ever put into any shovel. The blade is heat treated all over, stem to stern in the special heat-treating plant at the factory, during which treatment, each and every blade is tested by the Brinell process to a point that indicates the greatest possible resistance to abrasion. This treatment insures a very hard cutting edge that will stay sharp and a body that will not chip, crack or buckle.

The handles are made at the same Factory and are turned from specially selected XX Second Growth Northern White Ash. This particular kind and grade of timber is hard to get we are not prepared to sell handles to the general market but we are always glad to furnish them to users of RED EDGE Shovels. After the blade and handle has each been given their special treatment, they are put together to stay together.

The finished shovel is given a "rough and ready" test in a special device to show that it is fool-proof; also placed in a standard handle testing machine and subjected to a strain of 350 lbs. It is not until after each shovel has finally passed all of these tests that their edges are painted red to indicate that they are right for the guarantee that goes with each and every RED EDGE Shovel.

RED EDGE Shovels are so perfectly balanced that under the full load, a man becomes 100% efficient and feels better when a day's work is done.

Regarding the cost of operating shovels nowadays with high wages is one that is apt to be lost sight of, and if employers would consider what it would cost to operate a shovel, the trend all along the line would be for the best shovel obtainable. The larger companies realizing this have turned to RED EDGE Shovels as a solution.



GUARANTEE NO. 7450

WYOMING-MAYARI RED EDGE SHOVELS

BOUGHT ON THIS QUOTATION ORDER ARE HEREBY

GUARANTEED TO BE PERFECTLY SATISFACTORY IN EVERY RESPECT—UNDER EVERY CONDITION OF SERVICE—OR WE WILL MAKE WHATEVER ADJUSTMENT THE BUYER MAY DECIDE IS RIGHT AND PROPER, WITHOUT OBJECTION OR HESITATION.

THE WYOMING SHOVEL WORKS

BY H. Potter

The Wear Chart shown above is made up from the actual reports of thousands of shovelers. In factory testing machine a Pettebone Back Strap WYOMING-MAYARI RED EDGE SHOVEL of 13 gauge was mechanically thrust into a bank of gravel 150,000 times, covering a period of five days, and equivalent to 50 working days, and at the end of that time the wear on it was not sufficient to permit it at any point to enter a 14 gauge.



WYOMING "RED EDGE" SHOVELS

The shovel that is guaranteed. To avoid misunderstanding specify carefully pattern, size and style of handle desired. Considerable care should be exercised in the selection of the proper shape and size of tool for each particular use. The RED EDGE Shovels have been designed with the idea of providing the most efficient tool possible for each individual use to which it is to be put.

These Shovels are made in all the popular styles.

The Patent Pettebone Back Strap is intended for use where a very sturdy Shovel is required. It is especially built to stand heavy and strenuous work and will be found very suitable, excepting in the case where the material to be moved is sticky or of the consistency of wet clay.

The Plain Back Pattern is a popular type of shovel. The RED EDGE Plain Back Shovels are recommended for general use where a high grade tool is desired.

For removing material from one place to another without digging or prying, the Hollow Back Shovels are generally preferred because of their lightness of weight.

We especially recommend the Pettebone Patent Riveted Back Strap Shovels as they are the strongest type of shovel on the market. They are vastly different from the ordinary riveted back shovel—the rivets and straps are below the line of wear which removes the objections so common with the ordinary Riveted Back shovel.

THE PETTEBONE PATENT PROTECTED BACK STRAP

Handles cannot work loose because back strap forms part of socket. The patent back straps are completely below the line of wear. Will stand more prying, straining and heavy work than any other shovel in existence.

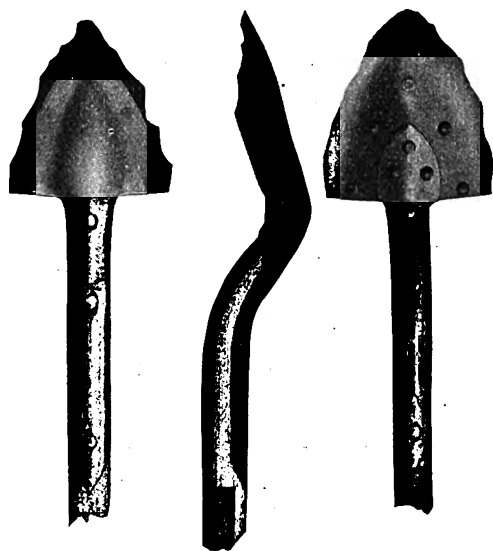


FIG. 2043

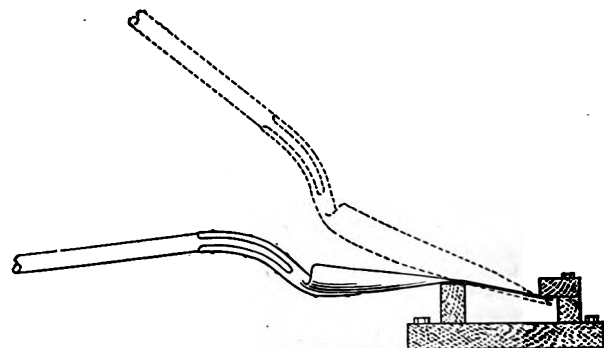


FIG. 2041

Every Red Edge Shovel and Scoop is tested in a test block similar to this illustration before the edge is painted red.

MOLDERS—PLAIN BACK

SQUARE POINT. DIRIGO HANDLE. POLISHED



FIG. 2054

No. 2 With RED EDGE Blade $9\frac{7}{8}'' \times 12''$ Per Dozen \$41

WYOMING "RED EDGE" SHOVELS

The shovel that is guaranteed. To avoid misunderstanding, specify carefully pattern, size and style of handle desired.

**LONG HANDLE—ROUND POINT—PETTEBONE PATENT**

BLACK FINISH, WITH SPECIALLY SELECTED XX SECOND GROWTH NORTHERN WHITE ASH HANDLES

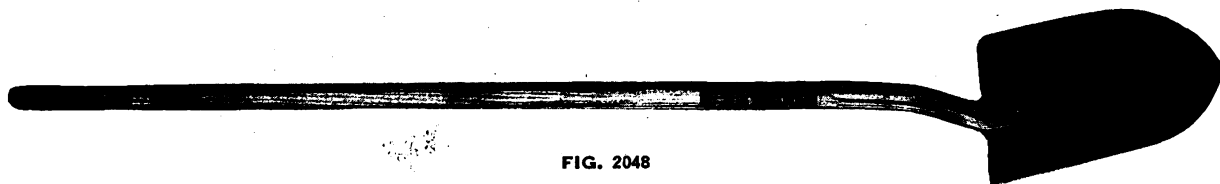


FIG. 2048

No. 2	With RED EDGE Blade	9 7/8" x 11 7/8"	.....	Per Dozen	\$36.00
No. 3	" " " "	10 1/4" x 12 1/2"	.....	" "	36.75
No. 4	" " " "	10 7/8" x 12 3/4"	.....	" "	37.50
No. 5	" " " "	11 3/8" x 13 1/4"	.....	" "	38.25
No. 6	" " " "	11 3/4" x 13 3/4"	.....	" "	39.00

LONG HANDLE—ROUND POINT—PLAIN BACK

BLACK FINISH WITH SPECIALLY SELECTED XX SECOND GROWTH NORTHERN WHITE ASH HANDLES

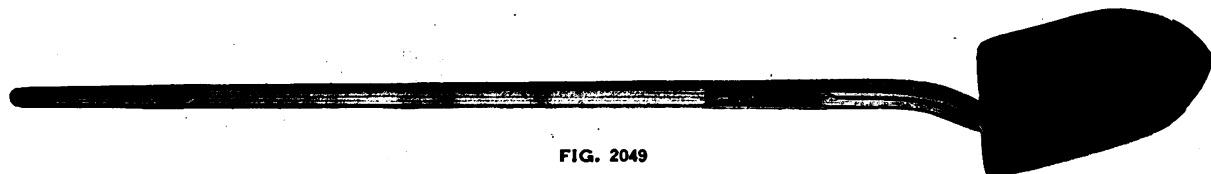


FIG. 2049

No. 2	With RED EDGE Blade	9 7/8" x 11 7/8"	.....	Per Dozen	\$39.00
No. 3	" " " "	10 1/4" x 12 1/2"	.....	" "	39.75
No. 4	" " " "	10 7/8" x 12 3/4"	.....	" "	40.50
No. 5	" " " "	11 3/8" x 13 1/4"	.....	" "	41.25
No. 6	" " " "	11 3/4" x 13 3/4"	.....	" "	42.00

LONG HANDLE—SQUARE POINT—PETTEBONE PATENT

BLACK FINISH, WITH SPECIALLY SELECTED XX SECOND GROWTH NORTHERN WHITE ASH HANDLES

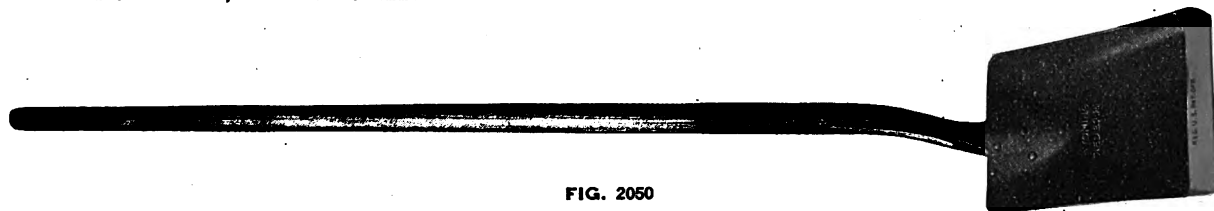


FIG. 2050

No. 2	With RED EDGE Blade	9 7/8" x 11 7/8"	.....	Per Dozen	\$36.00
No. 3	" " " "	10 1/4" x 12 1/2"	.....	" "	36.75
No. 4	" " " "	10 7/8" x 12 3/4"	.....	" "	37.50
No. 5	" " " "	11 3/8" x 13 1/4"	.....	" "	38.25
No. 6	" " " "	11 3/4" x 13 3/4"	.....	" "	39.00

LONG HANDLE—SQUARE POINT—PLAIN BACK

BLACK FINISH, WITH SPECIALLY SELECTED XX SECOND GROWTH NORTHERN WHITE ASH HANDLES

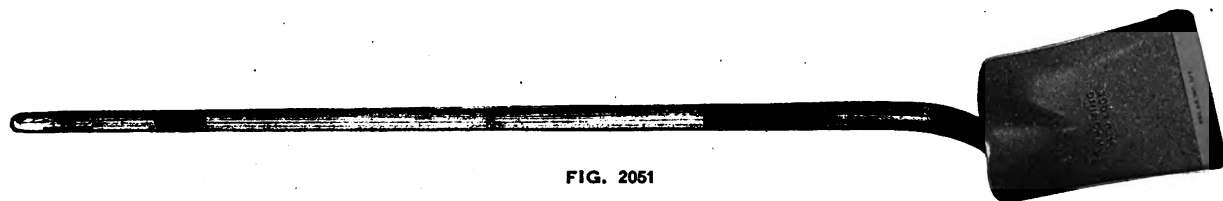


FIG. 2051

No. 2	With RED EDGE Blade	9 7/8" x 11 7/8"	.....	Per Dozen	\$39.00
No. 3	" " " "	10 1/4" x 12 1/2"	.....	" "	39.75
No. 4	" " " "	10 7/8" x 12 3/4"	.....	" "	40.50
No. 5	" " " "	11 3/8" x 13 1/4"	.....	" "	41.25
No. 6	" " " "	11 3/4" x 13 3/4"	.....	" "	42.00



WYOMING "RED EDGE" SHOVELS

The shovel that is guaranteed. To avoid misunderstanding, specify carefully pattern, size and style of handle desired.



D HANDLE—ROUND POINT—PETTEBONE PATENT
BLACK FINISH, WITH SPECIALLY SELECTED XX SECOND GROWTH
NORTHERN WHITE ASH HANDLES

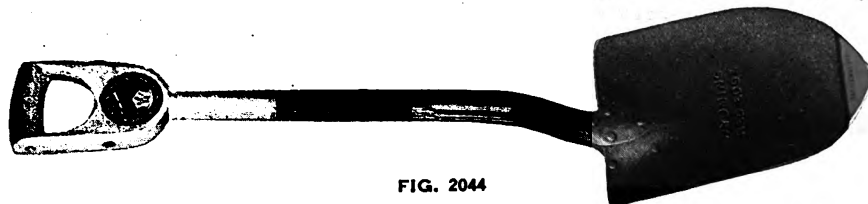


FIG. 2044

No.	2	3	4	5	6	With RED EDGE	Blade	9 7/8" x 12 7/8"	10 1/4" x 13 1/2"	10 7/8" x 13 3/4"	11 3/8" x 14 1/4"	11 3/4" x 14 3/4"	Per Dozen	\$36.00
No. 2														
No. 3														
No. 4														
No. 5														
No. 6														

D HANDLE—ROUND POINT—PLAIN BACK
BLACK FINISH, WITH SPECIALLY SELECTED XX SECOND GROWTH
NORTHERN WHITE ASH HANDLES

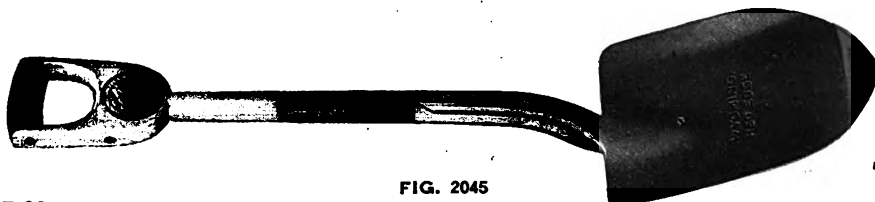


FIG. 2045

No.	2	3	4	5	6	With RED EDGE	Blade	9 7/8" x 12 7/8"	10 1/4" x 13 1/2"	10 7/8" x 13 3/4"	11 3/8" x 14 1/4"	11 3/4" x 14 3/4"	Per Dozen	\$39.00
No. 2														
No. 3														
No. 4														
No. 5														
No. 6														

D HANDLE—SQUARE POINT—PETTEBONE PATENT
BLACK FINISH, WITH SPECIALLY SELECTED XX SECOND GROWTH
NORTHERN WHITE ASH HANDLES

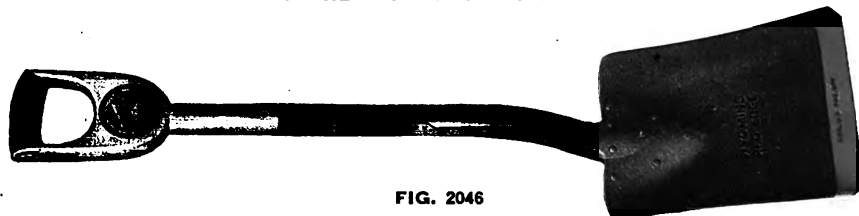


FIG. 2046

No.	2	3	4	5	6	With RED EDGE	Blade	9 7/8" x 11 7/8"	10 1/4" x 12 1/2"	10 7/8" x 12 3/4"	11 3/8" x 13 1/4"	11 3/4" x 13 3/4"	Per Dozen	\$39.00
No. 2														
No. 3														
No. 4														
No. 5														
No. 6														

D HANDLE—SQUARE POINT—PLAIN BACK
BLACK FINISH, WITH SPECIALLY SELECTED XX SECOND GROWTH
NORTHERN WHITE ASH HANDLES

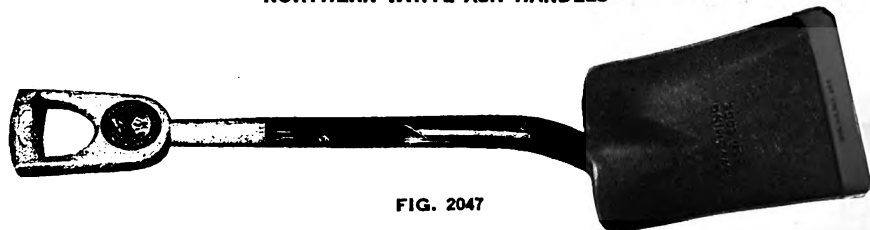


FIG. 2047

No.	2	3	4	5	6	With RED EDGE	Blade	9 7/8" x 11 7/8"	10 1/4" x 12 1/2"	10 7/8" x 12 3/4"	11 3/8" x 13 1/4"	11 3/4" x 13 3/4"	Per Dozen	\$39.00
No. 2														
No. 3														
No. 4														
No. 5														
No. 6														



WYOMING "RED EDGE" SHOVELS

The shovel that is guaranteed. To avoid misunderstanding specify carefully pattern, size and style of handle desired.



D HANDLE SCOOPS—PETTEBONE RIVETED BACK. EASTERN PATTERN.
BLACK FINISH, WITH SPECIALLY SELECTED XX SECOND GROWTH NORTHERN WHITE ASH HANDLES

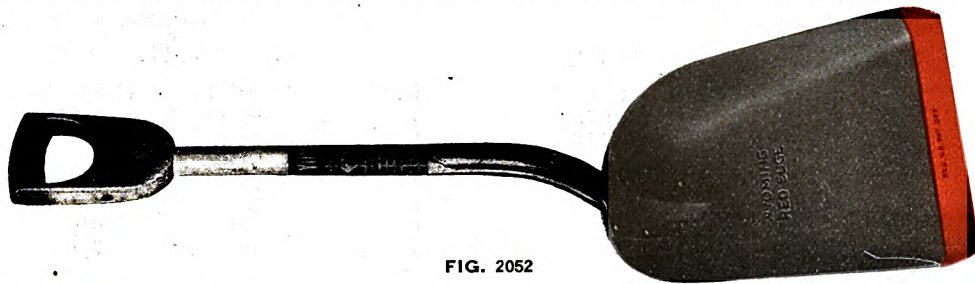


FIG. 2052

No. 2	With RED EDGE Blade	11 1/4" x 15"	.....	Per Dozen	\$39.00
No. 3	" " " "	11 1/2" x 15 1/2"	.....	" "	39.75
No. 4	" " " "	11 3/4" x 16"	.....	" "	40.50
No. 5	" " " "	12 3/8" x 16 1/2"	.....	" "	41.25
No. 6	" " " "	12 7/8" x 16 3/4"	.....	" "	42.00
No. 7	" " " "	13 3/8" x 17"	.....	" "	42.75
No. 8	" " " "	13 3/4" x 17 1/2"	.....	" "	43.50
No. 9	" " " "	14 1/2" x 18"	.....	" "	44.25
No. 10	" " " "	15 1/8" x 18 1/2"	.....	" "	45.00
No. 12	" " " "	15 3/4" x 19 3/4"	.....	" "	45.75

Prices on Western Pattern on application.

D HANDLE SCOOPS—HOLLOW BACK. EASTERN PATTERN.
BLACK FINISH, WITH SPECIALLY SELECTED XX SECOND GROWTH NORTHERN WHITE ASH HANDLES

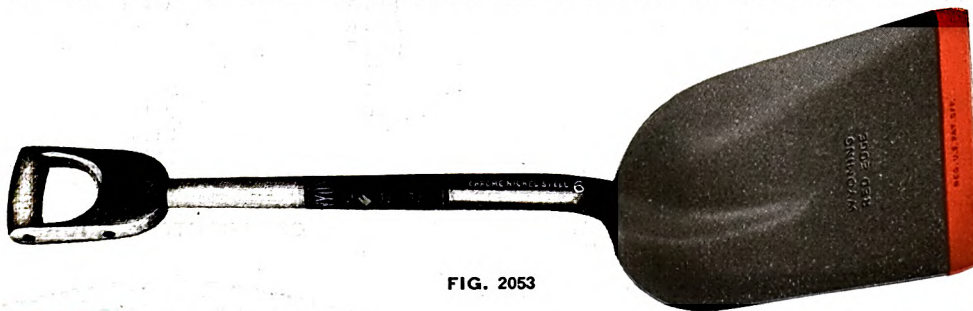


FIG. 2053

No. 2	With RED EDGE Blade	11 1/4" x 15"	.....	Per Dozen	\$39.00
No. 3	" " " "	11 1/2" x 15 1/2"	.....	" "	39.75
No. 4	" " " "	11 3/4" x 16"	.....	" "	40.50
No. 5	" " " "	12 3/8" x 16 1/2"	.....	" "	41.25
No. 6	" " " "	12 7/8" x 16 3/4"	.....	" "	42.00
No. 7	" " " "	13 3/8" x 17"	.....	" "	42.75
No. 8	" " " "	13 3/4" x 17 1/2"	.....	" "	43.50
No. 9	" " " "	14 1/2" x 18"	.....	" "	44.25
No. 10	" " " "	15 1/8" x 18 1/2"	.....	" "	45.00
No. 12	" " " "	15 3/4" x 19 3/4"	.....	" "	45.75

Prices on Western Pattern on application.

TRACK SHOVEL—PETTEBONE RIVETED BACK

BLACK FINISH, WITH SPECIALLY SELECTED XX SECOND GROWTH NORTHERN WHITE ASH "D" OR MALLEABLE DIRIGO HANDLE



FIG. 2055

Cut shows Shovel with full malleable handle.

No. 2	With RED EDGE Blade	9 7/8" x 11 7/8", Length over all, 42"	Per Dozen	\$45.00
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PICKS AND PICK EYES

DRIFTING PICK EYES



FIG. 2056

Soft Body ready for welding steel points.

No.	Weight lbs.	Price per doz.
1	3	\$11.25
1½	3½	12.00
2	4	12.75
3	4½	13.50
4	5	14.25
5	6	15.75

RAILROAD PICK EYES



FIG. 2057

Drawn ready for the steel.

No.	Weight lbs.	Price per doz.
1	4	\$12.75
2	4½	13.50
3	5	14.25
4	6	15.75

SURFACE PICK EYES



FIG. 2058

Soft Steel, Oil Finish.

No.	Weight lbs.	Price per doz.
1	4	\$12.75
2	4½	13.50
3	5	14.25
4	5½	15.00
5	6	15.75
6	6½	16.50
7	7	17.25

DRIFTING PICKS



FIG. 2059

Oil Finish

No.	Length In.	Weight lbs.	Price per doz.
1	21½	3	\$18.75
1½	22	3½	19.90
2	22½	4	21.00
3	23	4½	22.50
4	23½	5	24.00

ORE PICKS



FIG. 2060

Oil Finish

No.	Length In.	Weight lbs.	Price per doz.
1	21	6	\$21.75
2	22	7	23.25
3	23	8	25.50
4	24	9	28.50

SURFACE PICKS



FIG. 2061

Oil-Finish

No.	Length In.	Weight lbs.	Price per doz.
1	22	4	\$21.00
2	23	4½	22.50
3	23½	5	24.00
4	24	5½	25.50
5	25	6	27.00
6	25½	6½	28.50
7	26	7	30.00

RAILROAD PICKS, STANDARD



FIG. 2062

Polished and painted blue up to seven pounds; over that, oil finish.

Weight lbs.	Length Ins.	Price per doz.
4 to 5	Ass'd	\$19.50
5 to 6	"	21.00
6 to 7	"	22.50
4	21	19.50
5	22	20.25
6	23½	21.75
7	24½	23.25
8	25½	25.50

CONTRACTORS' PICKS



FIG. 2063

Oil Finish

No.	Length Ins.	Weight lbs.	Price per doz.
1	27	6	\$26.25
2	29	7	27.75
3	30	8	29.25
4	31	9	32.25
5	31½	10	35.25

CONCRETE PICKS



FIG. 2064

Oil Finish

Standard Weight, lbs.	Length Ins.	Price per doz.
10	29½	\$35.25

PICKS

MINING OR POLL PICKS



FIG. 2065

For Lead and Zinc mining. Oil Finish.

No.	Length Ins.	Weight lbs.	Price per doz.
1	14½	3½	\$22.50
2	15	4	24.00
3	15½	4½	25.50
4	16	5	27.75
5	17	6	30.00
6	18	6¾	32.25

PROSPECTORS' PICKS

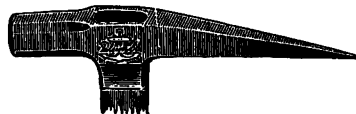


FIG. 2066

Hardened Point and Octagon Pole. Full Polished.

No.	Weight Head lbs.	Weight per doz. lbs.	Price per doz.
1	1	17	\$22.50
2	1½	22	24.00
3	2	31	25.50

POST HOLE AUGERS AND DIGGERS



FIG. 2079

VAUGHN AUGER

Cast steel blades, wrought pipe handle. 48 inches over all.

Diameter, ins....	6	7	8
Wt. per doz., lbs..	56	57	61
Price, each.....	\$1.85	1.85	1.85

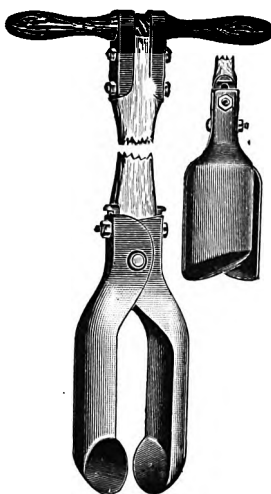


FIG. 2081

FENN ADJUSTABLE AUGER

Cast steel blades, hardwood handle and grip. No castings to break, or rivets to work loose. Blades have a 2-inch adjustment. Length, 46½ inches over all.

Diam., inches....	6	7
Digs holes, diam., inches.....	6 to 8	7 to 9
Weight per doz., lbs.	100	110
Price, each.....	\$3.10	3.10

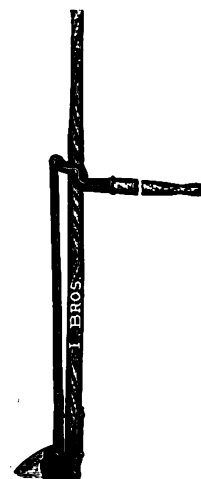


FIG. 2082

GIBBS DIGGER

Cast steel blade, malleable iron castings, wood handle. Length over all, 66 inches.

Diameter, inches.....	8
Wt. per doz., lbs.....	115
Price, each.....	\$2.90

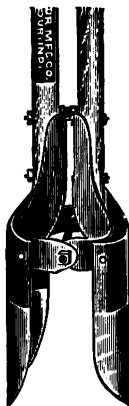


FIG. 2083

HERCULES DIGGER

Cast steel blades, malleable iron castings, wood handles. Length of handles, 4 feet. Length over all, 5 feet.

Diameter.....	inches	6
Weight per dozen.....	pounds	125
Price, each.....		\$2.75

IWAN IMPROVED AUGER

Cast steel blades, wrought pipe handle, wood grip, malleable castings. 4 feet long over all.

Diam., ins....	3	6
Wt. per doz., lbs.....	72	101
Price, each....	\$2.75	3.00
Diam., ins....	7	8
Wt. per doz., lbs.....	103	112
Price, each....	\$3.20	3.20

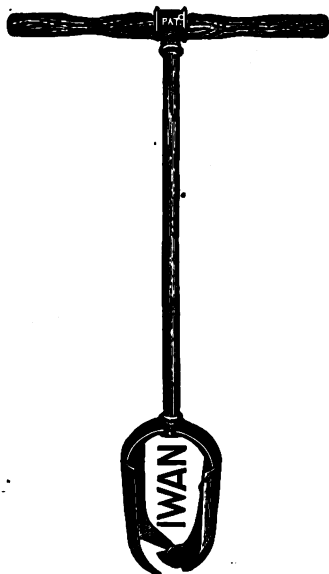


FIG. 2080

CEMENT AND SOD TAMPERS

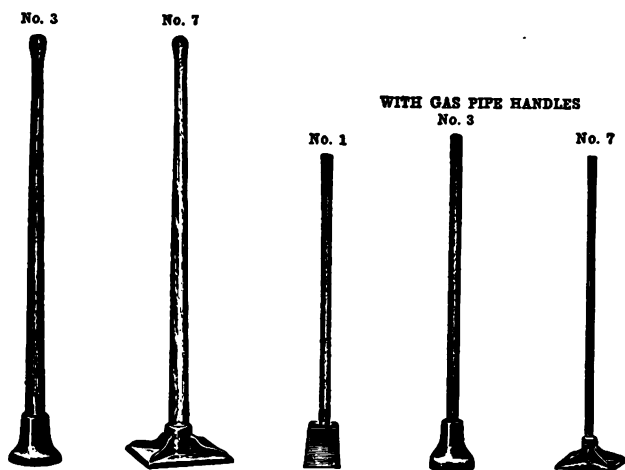


FIG. 2084

WITH WOOD HANDLES

No.	Description	Price per doz.
2	Face, 5-inch Diameter, Weight, 15 pounds each.	20
3	" 6 " " " " 20 " " "	31
4	" 6 " " " " 31 " " "	15
5	" 6x 6 in. Square, Weight, 12 pounds each.	17
5½	" 7x 7 " " " " 15 " " "	18
6	" 8x 8 " " " " 17 " " "	20
6½	" 9x 9 " " " " 18 " " "	26
7	" 10x10 " " " " 20 " " "	
8	" 12x12 " " " " 26 " " "	

WITH GAS PIPE HANDLES

1	Face, 2 ¾x4 ¼ inches, Weight, 18 pounds each.	
2	" 5-inch Diameter, Weight, 19 pounds each.	
3	" 6 " " " " 24 " " "	
4	" 6 " " " " 34 " " "	
5	" 6x 6 in. Square, Weight, 16 pounds each.	
5½	" 7x 7 " " " " 19 " " "	
6	" 8x 8 " " " " 21 " " "	
6½	" 9x 9 " " " " 22 " " "	
7	" 10x10 " " " " 24 " " "	
8	" 12x12 " " " " 30 " " "	
9	" 3x 6 " " " " 12 " " "	
10	" 4x 8 " " " " 18 " " "	
11	" 5x 7 " " " " 19 " " "	
12	" 6x 8 " " " " 21 " " "	
13	" 8x10 " " " " 23 " " "	

PEAVIES

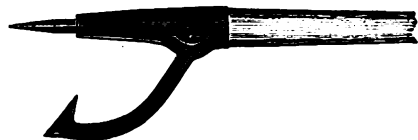


FIG. 2085

Forged steel socket, square tapered forged steel pick driven into handle, forged steel duck bill hook, turned handle.

No. 21 Length, feet.....	5
Diameter, inches.....	2½
Size hook, inches.....	½x7/8
Length hook, inches.....	13¾
Weight, dozen, lbs.....	125
Maple handle, wax finish. Price, each.....	\$3.60

CANT HOOKS



FIG. 2086

Forged steel clasp and extension toe ring, forged steel duck bill hook, selected timber turned handle.

Nos.	222	223
Length, feet.....	4½	5
Diameter, inches.....	2½	2¾
Weight, doz., lbs.....	100	110
Maple Handle, wax finish. Price, each.....	\$2.75	\$2.8

PEAVY OR CANT HOOK HANDLES



FIG. 2087

HICKORY

Length, feet.....	4½	5	5½
Diameter, inches.....	2½	2½	2¾
Weight doz., lbs.....	50	55	65
Price, each.....	\$1.25	\$1.50	\$1.90

MAPLE

Length, feet.....	4½	5	5½
Diameter, inches.....	2½	2½	2¾
Weight doz., lbs.....	45	50	55
Price, each.....	\$0.85	\$0.90	\$1.1

CROW BARS

OIL FINISH

FIG. 2068

ANGULAR POINT

Weight, lbs.	3	4	5	6	8	10	12	14	16	18	20	22	24	26	28	30	35	40	50	75
Square, inches.....	$\frac{5}{8}$	$\frac{3}{4}$	$\frac{7}{8}$	$\frac{7}{8}$	1	1	1 $\frac{1}{8}$	1 $\frac{1}{8}$	1 $\frac{1}{4}$	1 $\frac{1}{4}$	1 $\frac{1}{4}$	1 $\frac{1}{8}$	1 $\frac{3}{8}$	1 $\frac{3}{8}$	1 $\frac{1}{2}$	1 $\frac{1}{2}$	1 $\frac{5}{8}$	1 $\frac{3}{4}$	1 $\frac{3}{4}$	2
Length, inches.....	24	30	33	36	42	48	52	54	56	60	62	64	66	68	72	76	78	84	90	96
Price, per doz.....	\$10.80	10.80	10.80	10.80	10.80	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Price, per lb.....	...	...	...	...	...	\$.25	.25	.25	.25	.25	.25	.25	.25	.25	.25	.25	.25	.25	.25	.25

FIG. 2069

PINCH POINT**LINING BARS**

ROUND OR DIAMOND POINT

FIG. 2070

Weight, lbs.	10	18	20	22	24
Diam. inches	1 $\frac{1}{4}$	1 $\frac{1}{4}$	1 $\frac{1}{4}$	1 $\frac{1}{8}$	1 $\frac{3}{8}$
Length..... "	56	60	62	64	66
Price..... per lb.	\$0.12	.12	.12	.12	.12

CLAW BARS WITH HEEL

FORGED STEEL, OIL FINISH, TEMPERED CLAW

FIG. 2071

Weight	lbs.	20	24	26	28	30
Square..... inches	1 $\frac{1}{8}$	1 $\frac{5}{8}$	1 $\frac{5}{8}$	1 $\frac{3}{4}$	1 $\frac{3}{4}$	1 $\frac{3}{4}$
Length..... "	52	54	56	60	62	62
Price..... per lb.	\$0.16	.16	.16	.15	.15	.15

CARPENTERS WRECKING BARS

GOOSE NECK PATTERN



FIG. 2088

STRAIGHT PATTERN



FIG. 2089

Made from a very high grade of octagon tool steel and tested to lift 1100 pounds. Very useful in ripping floors and dismantling buildings. Largely used by construction men. The goose neck shape gives a powerful leverage for pulling planks, boards, nails, etc. Well hardened and tempered. Black finish.

Length inches	Stock inches	Cut inches	Weight per dozen, lbs.	Price per Dozen.	
				Goose Neck	Straight
24	$\frac{3}{4}$	1 $\frac{1}{2}$	43	\$8.00	\$8.00
30	$\frac{3}{4}$	1 $\frac{1}{2}$	53	9.00	9.00

RIVETING DOLLIES

FOR BRIDGE BUILDERS AND STRUCTURAL IRON WORKERS

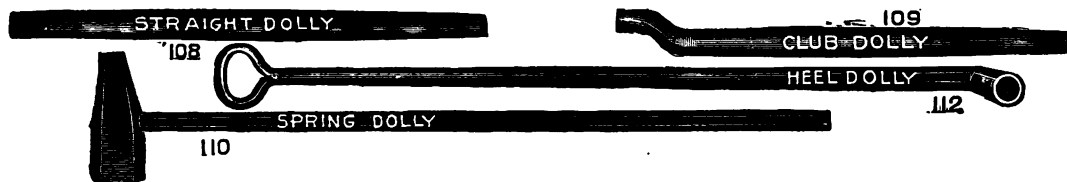
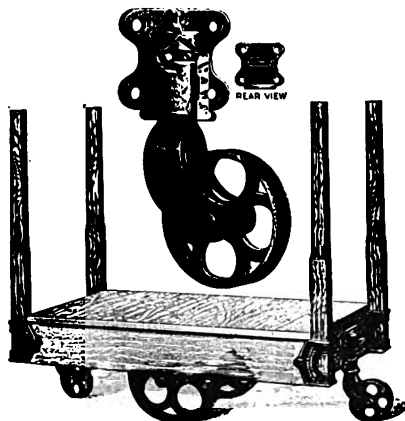


FIG. 2067

No.	Name & Description	For Rivets, Inches	$\frac{1}{2}$	$\frac{5}{8}$	$\frac{3}{4}$	$\frac{7}{8}$	Price Each
108	Straight Dolly	Weight, pounds	17 $\frac{1}{2}$	23 $\frac{1}{2}$	25 $\frac{1}{4}$	27	\$7.50
109	Club Dolly	Weight, pounds	17 $\frac{1}{2}$	21	20	23	8.00
110	Spring Dolly	Weight, pounds	12 $\frac{1}{2}$	18	29 $\frac{1}{2}$	29 $\frac{3}{4}$	13.50
112	Heel Dolly	Weight, pounds	11 $\frac{1}{4}$	22	....	30 $\frac{3}{4}$	12.00

FACTORY TRUCKS AND TRUCK IRONS



NO. 1 TRUCK—FIG. 2108

SIZES AND STYLES

No.	Platform, In.	Weight lbs.	Price
1	27 x 48	160	.....
1-A	30 x 48	170	.....
1-B	30 x 54	180	.....
2	30 x 60	270	.....
2-A	36 x 54	280	.....
2-B	36 x 60	290	.....
3	27 x 48	160	.....
3-A	30 x 48	170	.....
3-B	30 x 54	180	.....
4	27 x 48	190	.....
4-A	30 x 48	200	.....
4-B	30 x 54	210	.....
5	27 x 48	130	.....
5-A	30 x 48	140	.....
5-B	30 x 54	160	.....

These trucks are for general factory, warehouse, and mill use. They will withstand rather hard service and rough usage. They are not cheaply constructed, foundry-fitted Trucks, although sold at low prices, but are first-class in every particular. The iron work is carefully machined fitted and very strong.

The trucks are easy-running, rigid, and durable. The corner Sockets are of malleable iron and so interlocked with the frame of the truck as to make it thoroughly rigid and these corner sockets cannot work loose. The large wheels are bored and reamed out, and are so cast to overcome breakage of rim, so common with other large wheels and they do not cut into or mar the floor.

Center wheels 13½ inches diameter; 2½-inch face; casters with 6-inch wheels, malleable iron interlocking corner sockets.

No. 1 Series have four corner posts and one swivel caster at each end.

No. 2 Series have four corner posts and two swivel casters at each end.

No. 3 Series have corner posts, the two casters placed at one end and large wheels toward the other end.

No. 4 Series is the same style as the No. 1 except that the ends are boarded.

No. 5 Series are without posts, otherwise same as No. 1.

FACTORY TRUCK IRONS

We furnish the Iron Work to those who want to build their own frames. It is easy to do so with these Truck Irons. Simply get lumber out to size, bore a few holes, cut a small groove in each end piece for the long bolts and a saw kerf in each side piece for the corner irons, and the work is done, ready to put the truck together. We include all necessary bolts, nuts and washers.

IRON WORK FOR LUMBER BUGGY

We show in this cut a set of lumber buggy irons as furnished to parties who prefer to get out the wood-work to suit themselves by which they save profit and also the freight on the wood-work.

The wheels are 30 inch diameter with 2½-inch face, entirely of steel, with spokes welded into the hubs and tightly riveted into the rim or tire. One great advantage of these wheels over the ordinary wagon wheels is that the weather does not affect them, and they do not fall to pieces if left out doors.

A set of lumber buggy irons consists of two wheels, 1⅜ inch steel axle, turned to 1¼ inch for the wheels, and two axle boxes.

Axles furnished are for frames 30 inches wide. Longer axles can be furnished at a slight additional cost over the regular price.

Weight of iron work, per set, about lbs. 120

Price of iron work, per set. \$.....

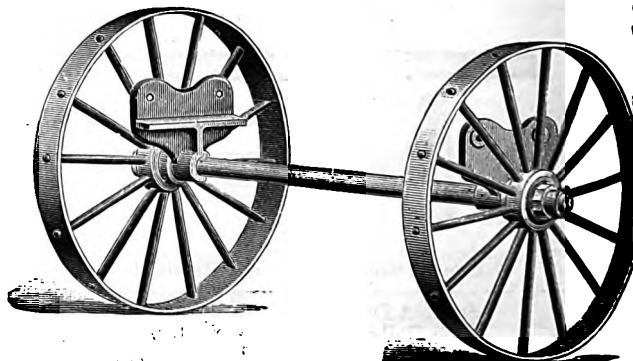


FIG. 2109

STERLING WHEELBARROWS AND CARTS

Sterling Barrows are built strong in every detail, strongest where strains will be greatest. They cut your barrow expense by long outlasting any other barrows you could buy. Sterling Barrows are scientifically designed. When raised to wheeling position, the wheel carries the brunt of the load. With Sterling Barrows your men can therefore do more work—more easily.

AN IMPORTANT PATENTED FEATURE OF STERLING BARROWS THE SELF-LUBRICATING WHEEL

No oiling necessary on a Sterling. The patented self-lubricating bushing is a permanent oiler. It not only lessens the effort of pushing but it absolutely prevents the wheel from rusting tight while in Winter storage. You can't trust workmen to keep their barrows oiled. You don't have to when you buy Sterling.

Description.—Diameter, 16 inches. Width of tread, $1\frac{1}{2}$ inches. Spokes, $\frac{1}{8}$ inch diameter in tension, shouldered and riveted to tire while hot. Tire made of $\frac{3}{8}$ inch bar steel with broad bearing surface. Double wrought iron and chilled steel hub. Instead of the ordinary weak machine bolt construction, the shaft is made of perfectly round open hearth steel, $\frac{5}{8}$ inch diameter. This shaft is cut to length and attached to dust-proof malleable iron brackets by cotter pins. There are no nuts to work off and be lost. This method also forms a rigid front brace for the handles and a perfect bearing for the wheel that is practically indestructible and thoroughly fool-proof. Wheels are shipped completely assembled and are easily attached to handles. The Sterling Wheel has ten spokes, all other wheels have only eight spokes.

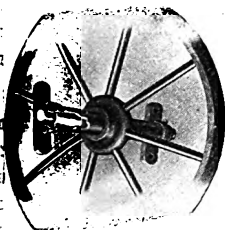


FIG. 2090

- 1—Forged Steel Wheel Guard.
- 2—Self-Lubricating Wheel.
- 3—Cold Rolled Steel Shaft.
- 4—Malleable Wheel Supports.
- 5—Double Cornered Riveted Trays.

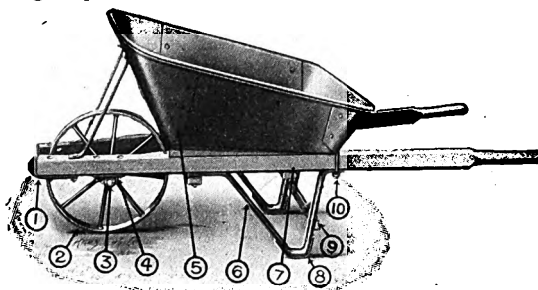


FIG. 2091

- 6—Heavy Channel Steel Legs with Flat Feet.
- 7—Tested Clear Maple Handles.
- 8—Extra Heavy Leg Shoes.
- 9—Riveted Leg Braces.
- 10—Patented Handle Clamps.



FIG. 2092



FIG. 2093

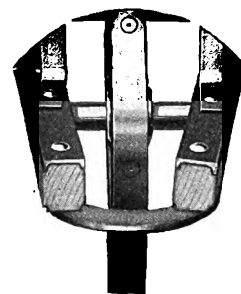


FIG. 2094

These Exclusive Features are also Important.

Figure 2092 Shows the patented handle clamp for attaching the channel steel legs to the continuous tubular frame. The thing is not weakened by drilling bolt holes in it at the point where the lifting strain comes.

Figure 2093. The patented handle clamp for wooden handled barrows. There is no weakening of the wooden handles at the main point. These clamps are used on all barrows which will be subjected to heavy service. They explain why there is so little breaking of handles on Sterling Barrows.

Figure 2094. The forged steel wheel guard or nose piece forms a perfect protection to the ends of the frame and the wheel when forward dumping. It also braces and connects the frame, thus eliminating all twisting strain that so often racks the barrow to pieces and disarranges the wheel bearings in ordinary barrows.

THE GREAT STRENGTH AND DURABILITY OF THE STERLING BARROW LEG CONSTRUCTION

Sterling Barrow legs are made of extra heavy channel steel. By making the leg feet with square bearing surface prolongs the life of the legs indefinitely. The ordinary barrow, when new, gives bearing surface only on the rounded point that touches the ground. Sterling barrows the wear is distributed over a surface approximately 3 inches long and $1\frac{3}{4}$ inches wide. The extra heavy leg shoes give further protection against wear. The triangular truss support absolutely prohibits buckling under or spreading apart.

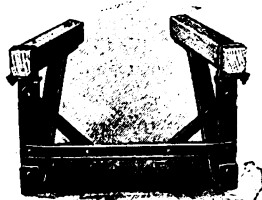


FIG. 2095

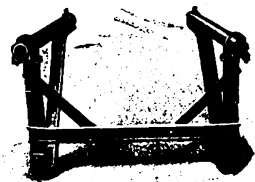


FIG. 2096

STERLING CONCRETE CARTS

SELF-LUBRICATING WHEELS

NO. 3 CONCRETE CART

This cart is exceptionally successful on heavy, dry, stiff material as the rounded bottom permits quick discharge. This means a considerable saving of laborer's time. Ease of discharge and long-lasting service are the points contractors like about this cart. Tray is of 14 gauge steel, securely riveted and re-inforced around top edge with angle iron having forged corners. Wheels 30 inches in diameter, with ample bearing surface on its 2-inch face. Legs are made of selected steel, extra heavy. Capacity, 6 cubic feet wet material; 7 cubic feet dry. This and the No. 5 Cart are the most popular and widely used concrete carts now on the market. Weight each, 190 pounds.

List price.....

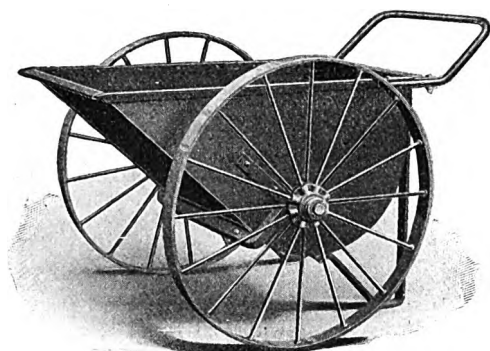


FIG. 2100

NO. 5 CONCRETE CART

Tray of 14 gauge steel, securely riveted. Bottom and sides of tray are reinforced by being riveted to 1-inch angle iron and crimped over an angle iron frame at the top. Axle is of $1\frac{1}{4}$ inch steel and is bent around the tray in such a way as to give it a tremendous reinforcement. Wheels are 36 inches diameter and tires are of bar steel, $2\frac{1}{2}$ inches wide by $\frac{3}{8}$ -inch thick. The strong spokes in tension are staggered to give the greatest possible strength. Legs are $1\frac{1}{2}$ inches by $\frac{3}{8}$ -inch bar steel with heavy cross braces firmly riveted. Wheels are self-lubricating. Capacity, 6 cubic feet wet; 7 cubic feet dry.

Weight each, 215 pounds. List Price,.....

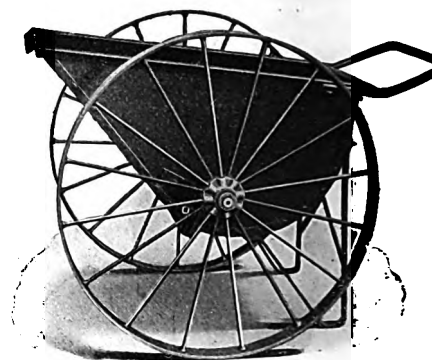


FIG. 2101

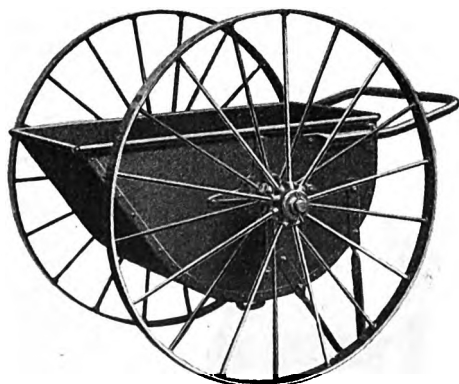


FIG. 5039

NO. 6 "IDEAL" CONCRETE CART

This cart is a decided improvement over any concrete cart previously manufactured, with every item of its construction designed for unusual strength, durability and ease of wheeling. The tray is reinforced with a so continuous $\frac{1}{2}$ -inch rod. This method prevents tray from breaking at edge corners. The handle is attached by means of clamps. These clamps strengthen the handle and eliminate the breakage caused by bolt holes. The wheels are 42-inch diameter by 2-inch face by 6-inch hub. Constructed 12 gauge steel. Capacity 6 cubic feet. Weight each, 246 pounds.

List Price.....

STERLING WHEELBARROWS AND CARTS

SELF-LUBRICATING WHEELS

NO. 4 FORWARD DUMP BARROWS

ESPECIALLY DESIGNED FOR CHARGING MIXERS

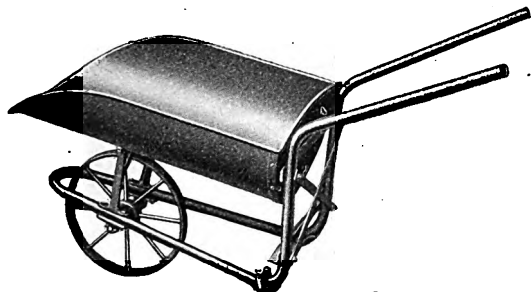


FIG. 2097

When raised to wheeling position, the load comes directly over the wheel. The wheel carries the load—the laborer simply balances and pushes. The amount of material that can be wheeled in this barrow without over-taxing the laborer's strength is greater than with any other style of barrow. The No. 4 has the patented continuous tubular frame construction. The steel is in one integral piece and forms the handles, tray support, legs, wheel support, and wheel guard. The leg portion is protected by extra heavy leg shoes clamped about the tubing. The scoop shape tray is of 16 gauge steel with reinforced edge. Self-lubricating wheel. There has never before been designed a barrow that has proven so popular with both the contractor and his men. It wheels easily and it lasts. Capacity $3\frac{1}{2}$ cubic feet.

NOS. 7, 7A, 7AA, AND 7B TUBULAR STEEL BARROWS

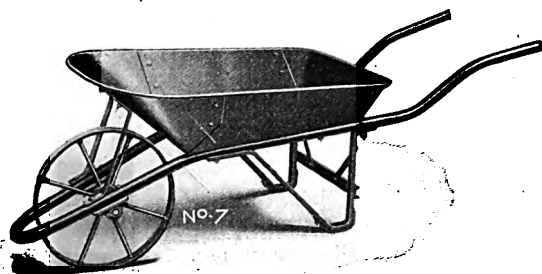


FIG. 2098

The same great strength and durability which have made these barrows so popular in iron foundry and mining work are giving them a tremendous popularity in contracting work. Season after season they last—and your barrow expense grows smaller and smaller.

CONTRACTORS' BARROWS NOS. 15, 16 AND 32

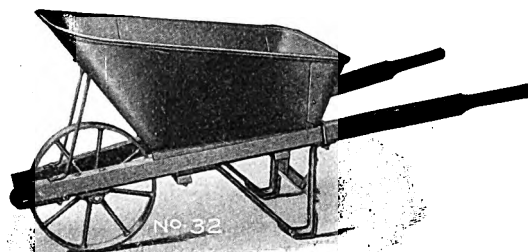


FIG. 2099

Embodied in addition to the patented Handle Clamps, the patented forged steel wheel guard which thoroughly protects the wheel and firmly braces the handles. These barrows will outlast two of any ordinary Contractor's Barrows.

NO. 9 AJAX CONCRETE BARROW



FIG. 5040

For handling sloppy concrete. Although deep and of large capacity, the tray is so shaped that contents are quickly and cleanly discharged and may be dumped either front or sideways. Legs are made of channel steel and equipped with shoes. Self-lubricating wheel. For table of capacities see page 644.

NO. 11 CONCRETE BARROW



FIG. 5041

This barrow is narrow in width so that it will pass through doorways. The tray is long, extending over the wheel, which balances the greater part of the load on the wheel, instead of on the wheeler's arms. It is a giant for strength, and is easy running. Tray has $\frac{1}{4}$ inch rod reinforcement in top edge. Heavy channel braces support the tray full length of front and at bottom. Channel steel legs. Self-lubricating wheel.

STERLING WHEELBARROWS

SELF-LUBRICATING WHEELS

SIZES AND PRICES

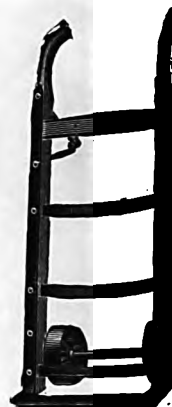
No.	Gauge	Cu. Ft. Capacity	Weight Lbs.	Price
4	12	3½	67	.....
4	16	3½	67	.....
7	12	3½	73	.....
7	14	3½	73	.....
7	16	3½	73	.....
7A	12	3¼	71	.....
7A	14	3¼	71	.....
7A	18	3¼	71	.....
7AA	18	3	53	.....
7B	12	4	74	.....
7B	14	4	74	.....
7B	16	4	74	.....
9	16	4½	70	.....
11	14	6	95	.....
15	12	3½	70	.....
15	14	3½	70	.....
15	16	3½	70	.....
*16	12	4½	74	.....
*16	14	4½	74	.....
*16	16	4½	74	.....
*32	16	4¾	78	.....

* Capacity of Wet Material 3 cu. ft.

FIG. 2110
HALF IRONED**TRUCKS**

FOR RAILROADS, WAREHOUSES AND PACKING HOUSES

These are two very widely used types. They are made of very carefully selected materials, are well constructed and are amply strong for all ordinary use. When specially ordered, these trucks can be supplied with either rubber tired wheels, or Fiber tired wheels. Finished in pigment primer, and varnished; iron parts black.

FIG. 2111
FULL IRONED

Size No.	Length of Handles Inches	Greatest Width, Inches	Length of Nose Inches	Size of Wheels Inches	Size of Axle Inches	Approx. Weight Pounds		Price	
						2110	2111	2110	2111
1	48	20	5	7x2	7/8 Rd.	47	50	\$10.00	.....
2	52	20	5	8x2½	7/8 Rd.	61	64	11.00	\$13.00
3	56	24	5	8x2½	1 1/8 Rd.	87	90	16.00	17.00

TIMBER DOLLIES

Standard; used either as a truck or as a Roller, when bottom side is up. Mort Hardwood Frame, Beveled Edges, Journals fitted in cast iron boxes, which are bolted on frame. Full height 6¾ inches.

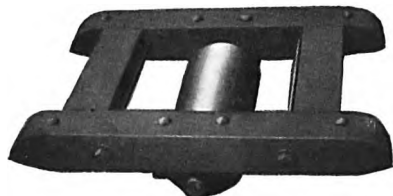


FIG. 2112

No.	Length Inches	Width Inches	Roller Inches	Weight Each Lbs.	Price Each
1	20	17	6x12	60	.....
2	24	20	6x12	62	.....

PLATE CASTERS

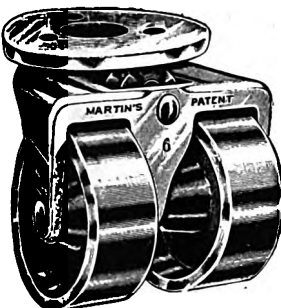
MARTIN PATTERN

IRON WHEELS, ROUND PLATE, BRONZED

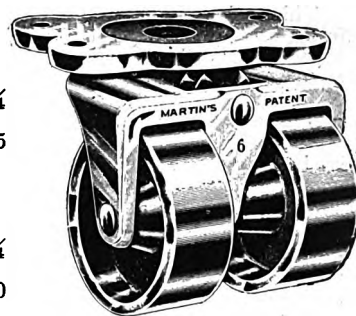
Nos.....	21	31	41	51	61	71
Size No.....	2	3	4	5	6	7
Diam. of wheels, in..	1	1 $\frac{3}{8}$	1 $\frac{5}{8}$	1 $\frac{7}{8}$	1 $\frac{3}{4}$	2 $\frac{1}{4}$
Weight per set, lbs...	1	2	3	4	6	7
Price per set of four..	\$1.20	1.40	1.50	1.70	2.20	2.65

IRON WHEELS, OBLONG PLATE, BRONZED

Nos.....	22	32	42	52	62
Size No.....	2	3	4	5	6
Diam. of wheels, ins.....	1	1 $\frac{3}{8}$	1 $\frac{5}{8}$	1 $\frac{7}{8}$	1 $\frac{3}{4}$
Weight per set, lbs.....	1	2	3	4	6
Price per set of four.....	\$1.15	1.25	1.50	1.75	2.00



NOS. 21 TO 71—FIG. 2104



NOS. 22 TO 62—FIG. 2105

TRUCK CASTERS

OBLONG PLATE, IRON WHEELS CARRYING CAPACITY, 1000 to 5000 POUNDS

No.	Size of Plate Inches	Diam. of Wheel Inches	Face of wheel Inches	Height Over All Inches	Weight Each Pounds	Price Each
6	3 x 4 $\frac{1}{4}$	2 $\frac{1}{2}$	1 $\frac{1}{8}$	2 $\frac{3}{4}$	1 $\frac{1}{8}$	\$0.50
8	3 x 4 $\frac{3}{4}$	3 $\frac{1}{8}$	1	3 $\frac{1}{2}$	2	.70
*18	3 x 4 $\frac{3}{4}$	3 $\frac{1}{8}$	1	3 $\frac{1}{2}$	2	.80
10	3 $\frac{1}{8}$ x 4 $\frac{3}{4}$	3 $\frac{5}{8}$	1	4 $\frac{1}{8}$	2 $\frac{1}{2}$	.80
11	3 $\frac{3}{8}$ x 5 $\frac{1}{8}$	4 $\frac{1}{8}$	1 $\frac{1}{8}$	4 $\frac{5}{8}$	3 $\frac{3}{4}$	1.25
14	4 $\frac{3}{8}$ x 7	5 $\frac{3}{8}$	1 $\frac{3}{4}$	6	8 $\frac{1}{2}$	2.50
16	4 $\frac{3}{8}$ x 8 $\frac{1}{4}$	7	1 $\frac{7}{8}$	7 $\frac{1}{2}$	12	3.50

*No. 18 has turned wheels, also holes for purpose of oiling axle—otherwise as No. 8.

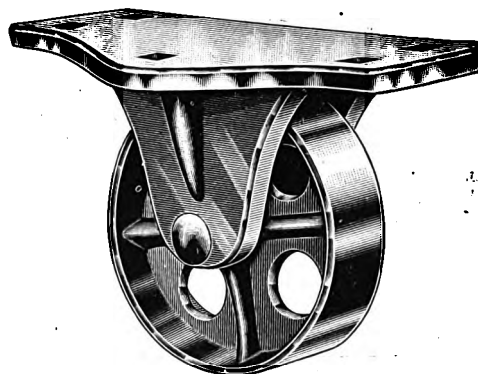


FIG. 2106

MARTIN ANTI-FRICTION TRUCK CASTERS

OBLONG PLATE

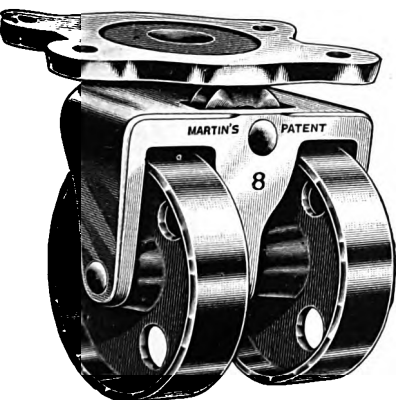


FIG. 2107

Number	Style of Wheel	Size of Plate Inches	Diam. of Wheels Inches	Face of Wheels Inches	Height Over All Inches	Carrying Capacity Pounds	Weight per Set Pounds	Price Per Set of Four
58	Lignumvitae	2 $\frac{1}{8}$ x 3 $\frac{1}{8}$	1 $\frac{7}{8}$	$\frac{1}{8}$	2 $\frac{5}{8}$	1000	4	\$2.60
68	Lignumvitae	2 $\frac{1}{2}$ x 3 $\frac{1}{2}$	1 $\frac{3}{4}$	$\frac{3}{4}$	2 $\frac{3}{4}$	1500	6 $\frac{1}{2}$	3.00
82	Iron	3 $\frac{1}{4}$ x 4 $\frac{3}{8}$	2 $\frac{1}{2}$	$\frac{3}{4}$	3 $\frac{1}{2}$	2000	11	3.75
182	Iron	3 $\frac{1}{4}$ x 4 $\frac{3}{8}$	2 $\frac{1}{2}$	$\frac{3}{4}$	3 $\frac{1}{2}$	2000	11	4.00
102	Iron	3 $\frac{3}{8}$ x 4 $\frac{1}{2}$	3 $\frac{1}{8}$	$\frac{3}{4}$	4 $\frac{1}{8}$	2500	13	4.50
112	Iron	3 $\frac{1}{2}$ x 5 $\frac{1}{8}$	3 $\frac{5}{8}$	$\frac{7}{8}$	4 $\frac{5}{8}$	3000	19	7.00
122	Iron	4 $\frac{1}{4}$ x 6 $\frac{3}{8}$	4 $\frac{3}{8}$	1 $\frac{1}{8}$	5 $\frac{7}{8}$	4000	40	12.00
142	Iron	5 $\frac{7}{8}$ x 7 $\frac{1}{8}$	4 $\frac{1}{2}$	1 $\frac{1}{4}$	6	5000	64	20.00

No. 182 has turned wheels, also holes for purpose of oiling the axle—otherwise as No. 82.

FAIRBANKS COUNTER AND PLATFORM SCALES

COUNTER SCALES WITH SCOOP OR PLATE

This scale is built regularly to weigh up to 35 pounds, its construction offering the required stability and strength, with excellent accuracy and sensitiveness. All scales listed below are equipped with scoop and fork, except No. 557, which has $9\frac{3}{4}$ " iron plate only. The scoop may be of tin or brass, and scales Nos. 555 and 565 are regularly fitted with extra large $\frac{1}{2}$ bushel scoop for weighing light material, such as feathers. Seamless scoop is regularly furnished. All three scales above mentioned are regularly furnished with beam graduated $8 \times \frac{1}{16}$ oz., to give the required accuracy and sensitiveness.

The other scales are regularly furnished with standard scoop and single beam graduated 5 lbs. x $\frac{1}{2}$ oz. The arrow-tip beam is of brass, with notched top to receive a nickel-plated hanging poise. Loose nickel-plated weights and counterpoise make up full capacity. Durable and attractive finish in baked enamel, maroon. Scales may be fitted with agate bearings at an additional price.

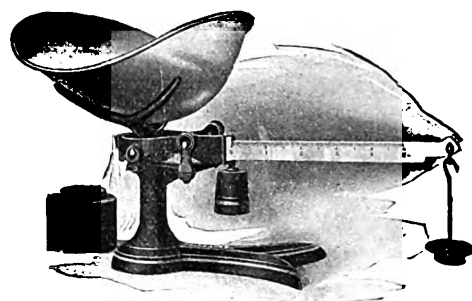


FIG. 2113

No.	Description	Capacity	Beam	Price each.
554	Single Beam, Tin Scoop.....	35 lbs. x $\frac{1}{2}$ oz.	5 lbs. x $\frac{1}{2}$ oz.	\$15.00
555	Single Beam, $\frac{1}{2}$ -bu. Tin Scoop.....	35 lbs. x $\frac{1}{16}$ oz.	8 lbs. x $\frac{1}{16}$ oz.	18.00
565	Single Beam, $\frac{1}{2}$ -bu. Brass Scoop.....	35 lbs. x $\frac{1}{16}$ oz.	8 lbs. x $\frac{1}{16}$ oz.	21.00
556	Single Beam, Brass Scoop.....	35 lbs. x $\frac{1}{2}$ oz.	5 lbs. x $\frac{1}{2}$ oz.	17.00
557	Single Beam, $9\frac{3}{4}$ " Iron Plate.....	35 lbs. x $\frac{1}{16}$ oz.	8 x $\frac{1}{16}$ oz.	14.00



FIG. 2114

Scoop Sizes: Nos. 554, 556, 22" long x $10\frac{1}{4}$ " wide x $5\frac{3}{4}$ " deep. Nos. 555, 565, 28" long x 15" wide x 9" deep.

PLATFORM SCOOP SCALE WITH SPLIT-HOOP SCOOP AND FORK

Commonly called the Union Scale, and offering combined scale with platform and scoop for general counter use. Strong, compact, all-metal scale. Scoop snugly supported in fork as shown, or made with split hoop to be set upon the counter and doing away with the objectionable plate and scoop balance weight. Fitted with arrow-tip brass beam, with nickel-plated poise and weights. Durable and attractively finished in maroon. Scale is fitted with tin or brass scoop as desired. Seamless scoops are regularly furnished.

No.	Description	Capacity Pounds	Platform Inches	Price Each
508	Single Beam, Tin Scoop.....	240	$10\frac{1}{2} \times 13\frac{1}{2}$	\$18.00
510	Single Beam, Brass Scoop.....	240	$10\frac{1}{2} \times 13\frac{1}{2}$	20.00
512	Double Beam, Tin Scoop.....	240	$10\frac{1}{2} \times 13\frac{1}{2}$	20.00
514	Double Beam, Brass Scoop.....	240	$10\frac{1}{2} \times 13\frac{1}{2}$	22.00

Note.—In the platform sizes above, the first figure is the dimension parallel with the beam.

Capacity.—30 lbs. x $\frac{1}{2}$ oz. in scoop; 240 x $\frac{1}{4}$ lbs. on platform.

Beam Graduations.—Single Beam—Upper graduations, 5 lbs. x $\frac{1}{2}$ oz.; lower graduations, 40 x $\frac{1}{4}$ lbs. Double Beam—Front bar graduated 4 lbs. x $\frac{1}{2}$ oz.; back bar graduated 32 x $\frac{1}{4}$ lbs.

Scoop Size.— $18\frac{3}{4}$ inches long x 9 inches wide x $5\frac{1}{4}$ inches deep.

PORTABLE PLATFORM SCALES WITH AND WITHOUT WHEELS

This type of Portable Platform Scale is one of the most efficient for general use and may be furnished either with or without wheels. It is equipped with arrow-tip single beam having a sliding poise with set-screw, all of brass. It may also be furnished with double beam, or full capacity beam at an additional price. From 1500-pound capacity up, all sizes have pillar braced with iron rod.

Durably and attractively finished in blue and gold, all well varnished for protection.

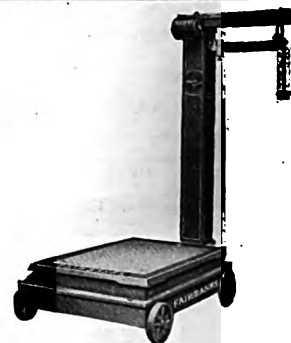


FIG. 2115

Capacity Pounds	Beam Pounds	Platform Inches	WITHOUT WHEELS		WITH WHEELS	
			No.	Price Each	No.	Price Each
2500	$100 \times \frac{1}{2}$	25×34	1100	\$85.00	1116	\$90.00
2000	$100 \times \frac{1}{2}$	25×32	1102	75.00	1118	80.00
1500	$100 \times \frac{1}{2}$	22×31	1104	56.00	1120	60.00
1000	$100 \times \frac{1}{2}$	18×27	1108	39.00	1124	43.00
500	$50 \times \frac{1}{4}$	16×25	1112	30.00	1128	33.00

WEAVER UNIVERSAL TIRE CHANGERS

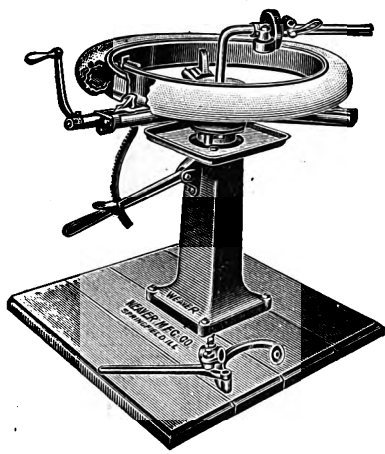


FIG. 2119

Will handle any size and style of auto tire or rim. The most difficult tires can be changed in a small fraction of the time required by the primitive methods usually employed.

The saving in time and labor will pay for the equipment in a very short time. The more prompt and efficient service which you will be able to give your trade will soon double your patronage.

Every operation in the handling of tires is done by means of smooth, polished rollers. There is no possibility of injuring either casing or tube even in the most stubborn cases. No pounding, no jamming, no cutting.

The best of material is used throughout and the construction is amply strong to withstand the severest service. Each Tire Changer is shipped set up complete and thus eliminates the necessity of assembling by the customer.

Shipping weight, 290 pounds.

Price, each.....

PYRENE FIRE EXTINGUISHER

WILL NOT FREEZE AT 50 DEGREES BELOW ZERO

TESTED, APPROVED AND LABELLED BY THE UNDERWRITERS' LABORATORIES, INC.

Pyrene Fire Extinguishers are 100% efficient on blazing gasoline, benzene, kerosene or other oils, or acetylene gas.

Water makes such fires worse. It spreads the flames. Also it will short-circuit the sparking system. Sand will ruin the motor.

Pyrene acts instantly. When heated to 200 degrees it turns into a heavy gas. This gas settles on the fire and shuts off the air supply.

Pyrene will damage nothing. It will not stain or mar the varnish or upholstery. But it will kill fire from any cause.

Brass finish with Black Bracket. Price, each..... \$10.00

Recharging Fluid, per quart..... 1.50

Recharging Fluid, per gallon..... 6.00



FIG. 2117



FIG. 2118

HAND CUT STEEL LETTERS AND FIGURES

The proper grade of steel is used in the construction of these hand cut steel figures and letters. A size suitable for the letter to go on it is used, and is long enough so it can be held without hitting the fingers.

PRICE LIST

Size In.	Figures Per Set of 9	Letters Per Set of 27	Letters or Fig- ures, Single Each	Size In.	Figures Per Set of 9	Letters Per Set of 27	Letters or Fig- ures, Single Each
$\frac{1}{32}$	\$5.00	\$15.00	\$0.60	$\frac{1}{8}$	\$5.00	\$15.00	\$0.65
$\frac{1}{16}$	4.50	13.50	.50	$\frac{3}{16}$	5.50	16.50	.70
$\frac{1}{8}$	4.50	13.50	.50	$\frac{1}{4}$	6.50	19.50	.80
$\frac{3}{16}$	3.50	10.50	.40	$\frac{5}{16}$	8.00	24.00	.90
$\frac{1}{4}$	3.50	10.50	.40	$\frac{3}{8}$	9.00	27.00	1.10
$\frac{5}{16}$	3.50	10.50	.40	$\frac{1}{2}$	11.00	33.00	1.30
$\frac{3}{8}$	3.50	10.50	.40	$\frac{5}{8}$	15.00	45.00	1.70
$\frac{1}{2}$	3.50	10.50	.40	$\frac{3}{4}$	19.50	58.50	2.30
$\frac{5}{8}$	4.00	12.00	.50	$\frac{7}{8}$	25.00	75.00	2.80
$\frac{3}{4}$	4.50	13.50	.55	1	31.50	94.50	3.60

PADLOCKS

YALE STANDARD

All bronze. Cast case. Two fluted keys. Lever tumblers.

CAST BRONZE SHACKLE WITHOUT CHAIN

Size, inches	$\frac{3}{4}$	1	$1\frac{1}{4}$	$1\frac{1}{2}$	$1\frac{3}{4}$	2	$2\frac{1}{4}$	$2\frac{1}{2}$
Number.....	800	813	823	833	843	853	863	873
Changes.....	24	48	48	48	48	144	144	144
Weight per doz. lbs	$\frac{3}{4}$	$1\frac{1}{4}$	2	4	5	$7\frac{3}{4}$	$9\frac{1}{4}$	$13\frac{3}{4}$
Price, per dozen...	\$29.75	20.00	22.00	25.00	28.05	31.00	38.50	54.60

WITH 9-INCH CHAIN

Size, inches	1	$1\frac{1}{2}$	$1\frac{3}{4}$	2	$2\frac{1}{4}$
Number.....	813 $\frac{1}{2}$	833 $\frac{1}{2}$	843 $\frac{1}{2}$	853 $\frac{1}{2}$	863 $\frac{1}{2}$
Weight per doz. lbs.....	$2\frac{1}{2}$	$5\frac{1}{4}$	$6\frac{1}{2}$	$9\frac{1}{2}$	10
Price, per dozen.....	\$22.40	29.20	32.25	35.20	42.70



FIG. 2125

WIRE SHACKLES

Cast Bronze Case and Bronze Wire Shackle. Two Bronze Fluted Keys, three Lever Tumblers. 48 Changes. The No. 815-N has cast bronze case nickel-plated and bronze wire, nickel-plated shackle.

Size, inches.....	1	1
Number.....	815	815N
Weight per doz. lbs. ...	2	2
Price per dozen.....	\$20.00	24.25



FIG. 2126

NOT MASTER KEYED

Cast bronze case. Steel shackle. Five pin tumblers. Two paracentric keys. Changes unlimited. These Padlocks being constructed on the Yale System, possess the highest security and a practically unlimited number of key changes. The locks are of unusually heavy construction; the shackles are of steel and are locked with two bolts, one engaging with either end of shackle.

Price List

Size, inches.....	$1\frac{1}{2}$	$1\frac{3}{4}$	2
Number.....	830	840	850
Weight per doz. lbs.....	6	$7\frac{1}{2}$	$9\frac{1}{2}$
Price dozen.....	\$28.80	35.75	43.70

MASTER KEYED

Any number of these padlocks, up to 850, can be furnished with keys all different and all controlled by one Master-Key or a somewhat less number of padlocks may be divided into groups, each group controlled by one Master-Key and all controlled by one grand Master-Key, and no two padlocks having keys alike.



FIG. 2124

TITAN



FIG. 2127

TERROR



FIG. 2129

DEFENDER



FIG. 2128

No. 225; Cast iron case, Bower-Barff finish. Steel panels and shackle, brass plated. Two flat keys. 6 Changes. Size 2 inches; Weight per dozen, 6 pounds.

Price per dozen..... \$7.95

Wrought Steel, Ivory Black; Steel Nickel-Plated Shackle. Two steel flat keys; two lever tumblers. 12 Changes.

Size, inches.....	$1\frac{1}{4}$	2
Number.....	612S	615S
Weight per doz. lbs.....	$2\frac{1}{2}$	$3\frac{1}{4}$
Price per doz.	\$6.00	7.10

Steel Case, Bower-Barff Finish, Steel Nickel-Plated Shackle, two Corrugated Steel Keys. Pin Tumbler, 36 Changes.

Size $1\frac{1}{2}$ inches; No. 743S; Weight per dozen 4 pounds.

Price per dozen..... \$19.85

Brass dipped bright case, steel nickel-plated shackle; two corrugated nickel-plated steel keys. 36 Changes.

Size $1\frac{1}{2}$ inches; No. 743V; weight per dozen 4 pounds.

Price per dozen..... \$23.85

TOOL CASES AND CHESTS FOR MECHANICS

FOR GARAGE AND ENGINE ROOM MACHINISTS USING HEAVY TOOLS

STYLE 11—TWO SIZES



FIG. 2130

Machinists using heavy tools, especially those working in garages and engine rooms, will find this a roomy and very practical and serviceable chest. Well made of oak, in the mission finish, and equipped with extra heavy brass plated trimmings. Lid is removable and may be slid under the bottom drawer. Drawer bottoms are three-ply birch. A strong cylinder lock with two flat steel keys is furnished.

Style No.	Drawers Inside		Inside Height Drawers					Price each
	Length in.	Depth in.	1st in.	2nd & 3rd in.	4th in.	5th in.		
11	8¼ & 18	9½	3	1½	2	4		\$27.00
12	11¼ & 24	11½	3	1½	2½	4½		32.00

Style 11....20½"x12¼"x12"

Style 12....26½"x14"x14"

"STANDARD" TOOLMAKERS' AND MACHINISTS' CASE

STYLE 31—FOUR SIZES

It has a convenient arrangement of different sized drawers—a place for every tool. A neater, more practical or compact tool case was never offered to the up-to-date mechanic. The lid is self-hinging, has a felt lined tray to lay tools on or can be slid under the bottom drawer. The workmanship, material and design can't be beat at any price. Drawer fronts are nicely figured and polished quartered oak, have sheet metal bottoms, felt lined, and trimmings are of brass, polished or nicked.

STYLE 031—THREE SIZES

This is similar to the standard No. 31 case but not covered. It is made of nicely figured quartered oak, in the medium or dark finish, hand rubbed and polished. Corners are dovetailed and rounded. The paneled lid forms a felt lined tray on the inside, is self-hinging, and rolls under the bottom drawer on steel bearings.



FIG. 2132

Style No.		Drawers Inside		Inside Height of Drawers								Price Each	
		Length in.	Depth in.	1st in.	2d in.	3d in.	4th in.	5th in.	6th in.	7th in.	8th in.	Style 31	Style 031
31	031	Short Dr. 6½ Long Dr. 14¼	6¼	1	2	1	¾	1½	¾	1¾	2½	\$28.00	\$27.00
31A	031A	Short Dr. 7½ Long Dr. 16¼	6¼	1	2	1	¾	1½	¾	1¾	2½	29.50	28.50
31B	031B	Short Dr. 8½ Long Dr. 18¼	6¼	1	2	1	¾	1½	¾	1¾	2½	31.00	30.00
31C		Short Dr. 8½ Long Dr. 18¼	7¼	1	2	1	¾	1½	¾	1¾	2½	33.00	.....

Style 31 and 031.....16x11¼x8½"
 Style 31A and 031A.....18x11½x8½"

Style 31B and 031B.....20x11½x8½"
 Style 31C.....20x11½x9½"

A LOW PRICED SUBSTANTIALLY CONSTRUCTED TOOL CASE

STYLE 70—TWO SIZES



FIG. 2133

Covered with imitation leather, fitted with brass plated trimmings, a good lock with two flat keys—each case having different keys. Four top drawers have felt lined bottoms. Lid is removable and can be slid under the bottom drawers. Drawer fronts are of Oak or finished Mahogany.

Style No.	Drawers Inside		Inside Height of Drawers						Price Each
	Length in.	Depth in.	1st in.	2d in.	3rd in.	4th in.	5th in.	6th in.	
70	6¼ & 14¼	7	¾	1¾	¾	1¾	1¾	3¾	\$20.00
70B	8¼ & 18¼	7	¾	1¾	¾	1¾	1¾	3¾	23.00

Style 70....16"x10½"x9¼"

Style 70B....20"x10½"x9¼"

TOOL CASES AND CHESTS FOR MECHANICS

MACHINISTS' AND TOOLMAKERS' CASE WITH DEEP TOP COMPARTMENT

STYLE 41—FOUR SIZES



FIG. 2131

A popular style for machinists and toolmakers desiring a portable tool case with a deep top compartment. Constructed of the best materials and covered with the best quality of imitation seal grain leather. This looks exactly like genuine leather and wears better. The front locks automatically when the top lid is down. This case holds more tools and is the strongest and handsomest case of its kind on the market. Drawer fronts are quartered oak or mahogany, trimmings nickeled. Top compartment and drawers felt lined. A mirror is furnished on inside of top lid. Covered with genuine seal grain cowhide at an additional charge.

Style No.	Top Compartment with Recess in Top Lid	Drawers Inside		Inside Height of Drawers							Price Each
		Length Inches	Depth Inches	1st Inches	2d Inches	3d Inches	4th Inches	5th Inches	6th Inches	7th Inches	
41	15x7½x3¼	Short Dr. 6⅝ Long Dr. 14¼	6¼	1	2	1	¾	1	¾	1¾	\$34.00
41A	17x7½x3¼	Short Dr. 7⅝ Long Dr. 16¼	6¼	1	2	1	¾	1	¾	1¾	36.00
41B	19x7½x3¼	Short Dr. 8⅝ Long Dr. 18¼	6¼	1	2	1	¾	1	¾	1¾	38.00
41C	19x8½x3¼	Short Dr. 8⅝ Long Dr. 18¼	7¼	1	2	1	¾	1	¾	1¾	40.00

Style 41.....16x12¼x8½"
 Style 41A.....18x12¼x8½"
 Style 41B.....20x12¼x8½"
 Style 41C.....20x12¼x9½"

MECHANICS' STYLE 45—TWO SIZES

This Portable Tool Case is popular with mechanics desiring several short drawers. The 20-inch length takes in an 18-inch scale and will hold a large kit of tools. This case is substantially constructed of the best materials, covered with black imitation seal grain leather. The drawer fronts are of nicely figured quartered oak and handsomely finished. Drawer bottoms are felt lined and shellac finished throughout. Equipped with self-hinging lid having a felt-lined tray. Trimmings, lock, handle, etc., are of the best quality.



FIG. 5042

Style No.	Drawers Inside		Inside Height of Drawers						Price Each
	Length Inches	Depth Inches	1st Inches	2d Inches	3d Inches	4th Inches	5th Inches	6th Inches	
45	Short Dr. 6⅝ Long Dr. 14¼	6¼	2¼	1	1	1	2	3	\$25.00
55	Short Dr. 8⅝ Long Dr. 18¼	7¼	2¼	1	1	1¼	2	3¼	29.00

Style 45.....16x11x8½"
 Style 55.....20x11½x8½"

COPPER TERMINALS

STANDARD "LUG" TYPE

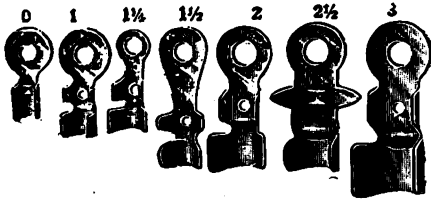


FIG. 2146

Made of copper, proper thickness to work well. High grade material. Best workmanship and a full assortment of the latest designs enable us to offer you the best line of terminals obtainable.

No.		Price per 100
0	Small Primary Wire, $\frac{1}{16}$ "	\$0.40
1	Regular Primary Wire, $\frac{1}{8}$ "	.50
1 1/4	Narrow Rim—Primary Wire, $\frac{1}{8}$ "	.80
1 1/2	Long Neck Primary Wire, $\frac{1}{4}$ "	1.00
2	Regular Magneto, $\frac{1}{8}$ "	1.00
2 1/2	Large Magneto, $\frac{3}{8}$ "	1.00
3	Large Secondary, $\frac{1}{2}$ "	1.40

SLIP STYLE

These Terminals are serviceable in practically all places, but particularly so on Spark Plug Nuts, etc.—heavy brass. Made in full range of sizes, suitable for all wires.

Numbers indicate inside diameter in thousandths of an inch.



FIG. 2147

Mfrs. No.	Size	For	Price per 100
200	.200	Primary	\$3.00
325	.325	Magneto	3.00
510	.510	Secondary	3.00



FIG. 2149

WING STYLE

Made the same as the Slip Style Terminal except that it is generally adapted to all sizes of cable by clamping down wings to cable.

	Price per 100
For All sizes cable	\$3.00

RING STYLE

Similar to the slip style but made with solid ring instead of slip type connector. Used where a solid connection is necessary or required. Supplied in two sizes only.



FIG. 2148

Mfrs. No.	Size	For	Price per 100
200	.200	Primary	\$3.00
510	.510	Secondary	3.00

REGULAR
FIG. 2150STUD
FIG. 2151THUMB NUT
FIG. 2152

Very desirable for making connection to the various makes of spark plugs. The regular is very generally used and fits the majority of all plugs.

Style	Price per 100
Regular	\$10.00
Stud	10.00
Thumb Nut	10.00

BATTERY CONNECTORS

STANDARD



FIG. 2153

Made of extra flexible rubber covered wire having a heavy cotton braid. Terminals are of soft copper, clamped on the wire and soldered.

Price per 100	\$2.00
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PERFECTION



FIG. 2154

The wire is extra flexible, rubber insulated and braided. The terminals are of soft copper, quickly attached. Used with or without battery nuts.

Price per 100	\$6.00
---------------	--------

BULLDOG



FIG. 2155

Consists of a length of flexible insulated wire, with special spring terminals. Can be easily attached or detached from cells with one hand.

Price per 100	\$6.00
---------------	--------

WIZARD DIRECT CURRENT MAGNETOS

LOW TENSION—TUBULAR CONSTRUCTION

FOR STATIONARY AND MARINE ENGINES

MAKE AND BREAK SPARK

TYPE A

For Multiple Cylinder or Engines up to 20 Horsepower.

The magnetic field of this type being larger than that of Type B, it can start a 3 or 4 H. P. engine without the aid of batteries, and can be run at a much lower speed, which means that the brushes, etc., will last much longer. Equipped with friction governing drive, round or flat belt drive, as ordered.

TYPE AC

Same as Type A, except that the spark coil being attached makes an extremely simple and efficient arrangement, as there are only two wires to connect to your engine. Equipped with friction governing drive, round or flat belt drive, as ordered.

TYPE B

For One-Cylinder Engines up to 8 Horsepower.

Suitable for starting 1 and 2 H. P. engines without the aid of batteries. Equipped with friction governing drive, round or flat belt drive, as ordered.

TYPE BC

For One-Cylinder Engine.

Exactly the same as Type B except that the coil is part of the magneto. This makes a very compact as well as extremely simple and efficient arrangement as there are only two wires to connect direct to your engine.

Equipped with friction governing drive, round or flat belt drive, as ordered.

JUMP SPARK

TYPE HK

For All Two-Cycle and Marine Engines and Multiple Cylinder Stationary Engines up to 20 Horsepower. Equipped with friction governing drive, round or flat belt drive, as ordered.

TYPE R

For One-Cylinder Four-Cycle Stationary Engines only up to 10 horsepower.

Equipped with friction governing drive, round or flat belt drive, as ordered.

DIMENSIONS AND PRICES

Types	Length Inches	Width Inches	Height Inches	Weight Pounds	Price Each	Extra for Flat or Round Belt Governor
A	10	5 $\frac{3}{4}$	7 $\frac{1}{2}$	16	\$20.00	\$2.25
AC	10	5 $\frac{3}{4}$	7 $\frac{1}{2}$	18	23.00	2.25
B	10	5 $\frac{3}{4}$	7	13	18.00	2.25
BC	10	5 $\frac{3}{4}$	7	15	20.50	2.25
HK	12	6	8	24	28.50	2.25
R	10	5 $\frac{3}{4}$	7 $\frac{1}{2}$	18	22.50	2.25

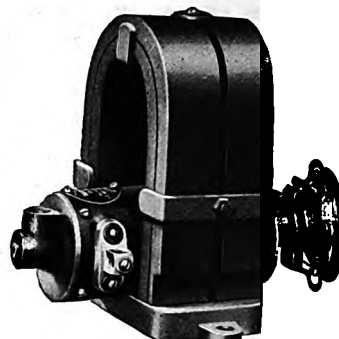


FIG. 2158

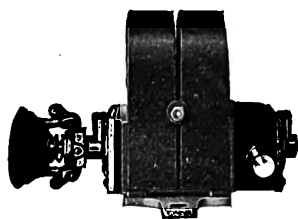


FIG. 5043

HENRICKS MAGNETOS

WITH FRICTION GOVERNOR

Henricks Magnetos are made with a completely enclosed armature, so that dirt and moisture are kept out.

The two bearings are lubricated with wick oilers, with removable caps over the oil holes.

The brush holders are removable for inspection of the brushes.

Can also be furnished with Belt Pulley, either for round or flat belt.

Size 4 x 5 $\frac{1}{2}$ x 9. Weight 12 pounds.

Type S5 for Make and Break Spark only, requiring a speed of 1500 R. P. M.

Price, each.....\$15

Type S5C with coil and magneto.

Price, each.....17

Type J5 for Jump Spark only, requiring a speed of 2500 R. P. M.

Price, each.....17

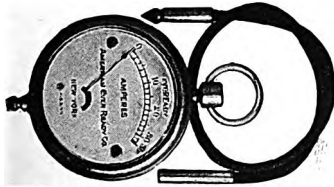
Type S5X for large multiple cylinder engines, Make and Break Spark only, requiring a speed of 1500 R. P. M.

Price, each.....18

Type J5X for Jump Spark only, for large multiple cylinder engines, requiring a speed of 1500 R. P. M.

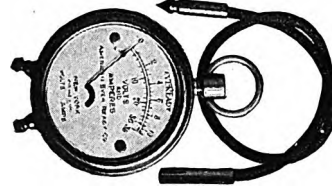
Price, each.....19

Belt Governor $\frac{3}{8}$ inch round or $\frac{3}{4}$ inch flat, extra.....1

POCKET AMMETERS

NO. 1002
FIG. 2156

2-In. Diameter, $\frac{1}{2}$ in. thick. Range of Ammeter is 0 to 35 Amperes; Nickel Plated, hardened and polished pivots, flexible cord attached to upper contact. Weight $\frac{1}{2}$ lb. Price each \$1.00

POCKET VOLT AMMETERS

No. 1003
FIG. 2157

2 In. Diameter, $\frac{1}{2}$ in. thick. Range of Volt-Ammeter is 0 to 35 amperes and 0 to 10 volts, nickel plated, hardened and polished pivots, flexible cord attached to upper contact. Weight $\frac{1}{2}$ pound. Price, each \$1.30

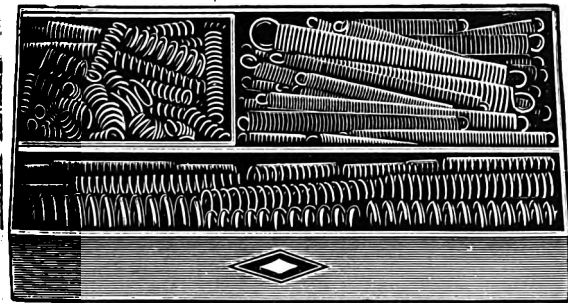
ASSORTED AUTOMOBILE SPRINGS**THE EVERY-DAY SPRING OUTFIT
ASSORTMENT A**

FIG. 5044

An assortment of most commonly used sizes of compression and extension springs, covering the everyday needs of a garage or machine shop. Contains Tempered Steel springs for valves, cut-outs, brakes, clutches, etc., running from about 1" to 12" long, from about $\frac{1}{8}$ " to 1" in diameter and from No. 20 to No. 12 gauge.

Put up in the following assortments:

No. 2A Box contains 100 springs.	Price.....	\$5.00
No. 3A " " 50 "	Price.....	3.00

**THE LIGHT SPRINGS SPECIAL ASSORTMENT
ASSORTMENT B**

This assortment contains a large variety of very light Music Wire, Brass or Bronze compression and extension springs, such as used on carburetors, generators, air controls, vacuum systems and ball checks.

In machine shops there is a steady and large call for light springs of this nature for refitting of machines and special devices.

The springs run from 1" to 6" long, from about $\frac{1}{16}$ " to $\frac{1}{2}$ " outside diameter, from .025 to .067 gauge.

Put up in following assortments:

No. 5B Box contains 100 springs.	Price.....	\$5.00
No. 6B " " 50 "	Price.....	3.00

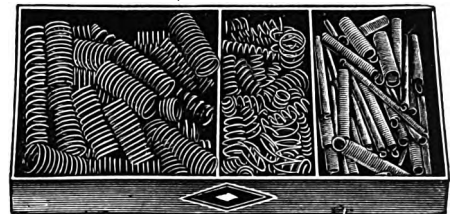


FIG. 5045

**LAMP CORD
COTTON OR SILK INSULATED
COLORS YELLOW AND GREEN****NEW CODE CORD**

FIG. 2144

This cord is made to conform to the latest National Electrical Code Standard which requires that a vulcanized rubber insulation conforming to stretch, breaking weight, electrical and chemical test be placed around each conductor, over which is placed the usual cotton or silk outer braid. This cord differs from the old code only in the fact that the insulation is of a higher quality of rubber. Marking: one red and two green threads cabled with copper strands.

COMMERCIAL CORD

FIG. 2145

Commercial lamp cord has a seamless insulation of $\frac{1}{16}$ inch rubber placed over a tight close wind of fine cotton over which is placed the usual cotton or silk outer braid. This cord is not approved by the National Board of Fire Underwriters.

NEW CODE—COMMERCIAL

Size B. & S.....	10	12	14	16	18	20	22
Silk,	Price per 100 feet.....						
Cotton,	Price per 100 feet.....						

WIRE

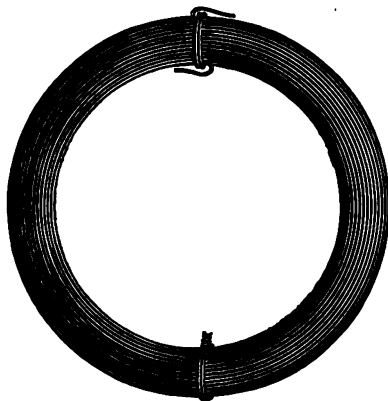


FIG. 2134

DIFFERENT STANDARDS FOR WIRE GAUGES
IN USE IN THE UNITED STATES
DIMENSIONS OF SIZES IN DECIMAL PARTS OF AN INCH

Number of Wire Gauge	American or Brown & Sharpe	Birmingham or Stubs Wire	Washburn & Moen Mfg. Co., Worcester, Mass.	Imperial Wire Gauge	Stubs Steel Wire
000000	.....	.....	.....	.464	....
00000	.....	.....	.....	.432	....
0000	.46	.454	.3938	.400	....
000	.40964	.425	.3625	.372	....
00	.3648	.38	.3310	.348	....
0	.32486	.34	.3065	.324	....
1	.2893	.3	.2830	.300	.227
2	.25763	.284	.2625	.276	.219
3	.22942	.259	.2437	.252	.212
4	.20431	.238	.2253	.232	.207
5	.18194	.22	.2070	.212	.204
6	.16202	.203	.1920	.192	.201
7	.14428	.18	.1770	.176	.199
8	.12849	.165	.1620	.160	.197
9	.11443	.148	.1483	.144	.194
10	.10189	.134	.1350	.128	.191
11	.090742	.12	.1205	.116	.188
12	.080808	.109	.1055	.104	.185
13	.071961	.095	.0915	.092	.182
14	.064084	.083	.0800	.080	.180
15	.057068	.072	.0720	.072	.178
16	.05082	.065	.0625	.064	.175
17	.045257	.058	.0540	.056	.172
18	.040303	.049	.0475	.048	.168
19	.03589	.042	.0410	.040	.164
20	.031961	.035	.0348	.036	.161
21	.028462	.032	.03175	.032	.157
22	.025347	.028	.0286	.028	.155
23	.022571	.025	.0258	.024	.153
24	.0201	.022	.0230	.022	.151
25	.0179	.02	.0204	.020	.148
26	.01594	.018	.0181	.018	.146
27	.014195	.016	.0173	.0164	.143
28	.012641	.014	.0162	.0149	.139
29	.011257	.013	.0150	.0136	.134
30	.010025	.012	.0140	.0124	.127
31	.008928	.01	.0132	.0116	.120
32	.00795	.009	.0128	.0108	.115
33	.00708	.008	.0118	.0100	.112
34	.006304	.007	.0104	.0092	.110
35	.005614	.005	.0095	.0084	.108
36	.005	.004	.0090	.0076	.106
37	.004453	.....	.....	.0068	.103
38	.003965	.....	.....	.0060	.101
39	.003531	.....	.....	.0052	.099
40	.003144	.....	.....	.0048	.097

WEIGHTS OF WIRE
WEIGHT OF STEEL, COPPER, AND BRASS WIRE
 By American [Brown and Sharpe] Gauge
WEIGHT OF WIRE PER 1,000 LINEAL FEET

No. of Gauge	Steel, lbs.	Copper, lbs.	Brass, lbs.
0000	565.50	642.68	615.21
000	445.45	509.32	487.92
00	355.65	404.20	388.94
0	282.02	320.50	308.83
1	223.68	254.20	243.35
2	177.38	201.60	192.98
3	140.67	159.86	153.02
4	111.57	126.78	121.37
5	88.46	100.54	96.26
6	70.15	79.72	76.32
7	55.56	63.23	60.53
8	44.12	50.14	48.00
9	34.99	39.77	38.07
10	27.74	31.53	30.18
11	22.01	25.01	23.94
12	17.46	19.83	18.99
13	13.84	15.73	15.06
14	10.98	12.47	11.94
15	8.704	9.890	9.468
16	6.903	7.843	7.508
17	5.474	6.220	5.955
18	4.342	4.933	4.723
19	3.443	3.912	3.755
20	2.730	3.102	2.970
21	2.165	2.460	2.355
22	1.717	1.951	1.868
23	1.361	1.547	1.481
24	1.080	1.227	1.175
25	.8563	.9731	.9316
26	.6791	.7716	.7387
27	.5385	.6120	.5858
28	.4270	.4853	.4645
29	.3386	.3849	.3683
30	.2686	.3052	.2922
31	.2130	.2421	.2318
32	.1693	.1919	.1837
33	.1340	.1522	.1457
34	.1062	.1207	.1155
35	.0842	.0957	.0916
36	.0668	.0759	.0727
37	.0530	.0602	.0577
38	.0420	.0478	.0457
39	.0333	.0397	.0366
40	.0264	.0300	.0287

COIL WIRE

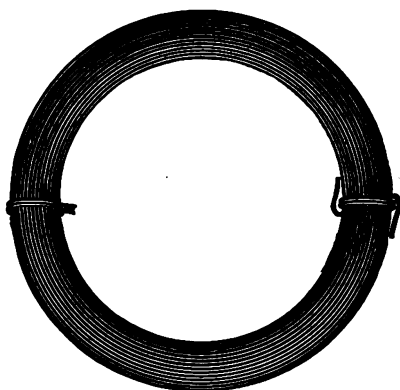


FIG. 2135

STEEL WIRE COMMERCIAL GRADE

Gauge Nos. (Washburn & Moen) 0 to 20. See table page 654.
Bright Galvanized Tinned Coppered In 100 lb. coils
Price per pound.....

ANNEALED STEEL STONE WIRE

Gauge Nos. (Washburn & Moen) 16 to 34. See table page 654.
12 Pounds in a Stone.
Black, price per pound.....
Galvanized, price per pound.....

COPPERED SPRING STEEL WIRE

Gauge Nos. (Washburn & Moen) 0000 to 20. See table page 654.
Price per pound.....

ANNEALED STEEL STOVE PIPE WIRE

Gauge No. 18. 50 Feet in a Coil.

Black, price per doz. Coils.....
Galvanized, price per doz. Coils.....

BLACK OIL TEMPERED CAST STEEL SPRING WIRE

Gauge Nos. (Washburn & Moen) 0000 to 20. See table page 654.
Annealed, Price per pound.....
Unannealed, Price per pound.....

CAST STEEL MUSIC WIRE

Gauge No.....	00	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
Diam. inch.....	.0085	.009	.010	.011	.012	.013	.014	.016	.018	.020	.022	.024	.026	.028	.030	.032	.034	.036	.038	.040	.042
Feet in pound.....	5263	4545	3700	3030	2560	2170	2000	1420	1130	917	767	636	540	467	406	357	322	285	256	232	208
Weight, lbs. per 100 Feet.....	.019	.022	.027	.033	.039	.046	.05	.07	.088	.109	.13	.157	.185	.214	.246	.28	.31	.35	.39	.43	.48
lb. Pkgs., Price ea.....																					
Gauge No.....	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36				
Diam. inch.....	.044	.046	.048	.051	.055	.059	.063	.067	.071	.074	.078	.082	.086	.090	.094	.098	.102				
Feet in pound.....	192	172	159	140	120	105	92	82	72	66	60	54	49	45	41	38	35				
Weight lbs., per 100 ft....	.52	.58	.63	.71	.83	.95	1.08	1.23	1.38	1.50	1.66	1.83	2.02	2.21	2.42	2.62	2.83				
lb. Pkgs., price each.....																					

Can also be furnished in $\frac{1}{4}$ and $\frac{1}{2}$ lb. packages at extra price.

SOFT BRASS WIRE

In Coils

Gauge Nos. (Brown & Sharpe) 0000 to 30. See table page 654.
Price per pound.....

SOFT COPPER WIRE

In Coils

Gauge Nos. (Brown & Sharpe) 0000 to 30. See table page 654.
Price per pound.....

SPRING BRASS WIRE

In Coils

Gauge Nos. (Brown & Sharpe) 1 to 26. See table page 654.
Price per pound.....

WIRE ON SPOOLS

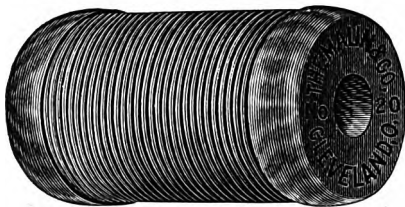


FIG. 2136

ANNEALED STEEL WIRE

Gauge of Wire, Nos.....	16	17	18	19	20	22	24	26	28	30	32	34	36
Quarter Lb. Spools, per doz.....	\$0.96	.96	.96	1.02	1.02	1.10	1.14	1.20	1.22	1.34	1.47	1.68	2.20
Half Lb. Spools, " ".....	\$1.58	1.60	1.64	1.66	1.68	1.80	1.94	2.04	....	....	....	....	....
One Lb. Spools, " ".....	\$2.46	2.56	2.64	2.68	2.76	2.96	3.15	3.30	....	....	....	....	....

ANNEALED TINNED STEEL WIRE

Gauge of Wire, Nos.....	18	19	20	22	24	26	28	30	32	34	36
Quarter Lb. Spools, per doz.....	\$1.20	1.25	1.25	1.32	1.40	1.50	1.65	1.78	2.11	2.24	3.17

SPRING BRASS WIRE

Gauge of Wire, Nos.....	16	17	18	19	20	22	24	26	28	30	32
Quarter Lb. Spools, per doz.....	\$2.20	2.20	2.20	2.20	2.20	2.40	2.60	2.70	3.46	4.20	4.92
Half Lb. Spools, " ".....	\$3.90	3.90	3.90	3.90	3.90	4.40	4.70	....	....	....	....

SOFT COPPER WIRE

Gauge of Wire, Nos.....	16	17	18	19	20	22	24	26	28	30	32	34	36
Quarter Lb. Spools, per doz.....	\$2.20	2.20	2.20	2.20	2.20	2.40	2.60	2.70	3.46	4.20	4.92	6.42	10.10
Half Lb. Spools, " ".....	\$3.90	3.90	3.90	3.90	3.90	4.40	4.70	4.90	6.12	7.44	....	....	....

HAIR WIRE

Gauge of Wire, Nos.....	26	28	30	32	34	36	38
Black, Per Gross Spools.....	\$3.50	3.50	3.75	4.00	4.25	5.25	6.25
Tinned, Per Gross Spools.....	\$4.25	4.25	4.50	4.75	5.00	6.00	7.00

WIRE CLOTH

WE CAN FURNISH STEEL, BRASS, COPPER AND BRONZE WIRE CLOTH FOR ANY SERVICE

SUGGESTIONS IN ORDERING WIRE CLOTH

When ordering Wire Cloth please state the kind and size of wire, mesh, length and width desired. If unable to furnish data regarding mesh and wire, send a sample of the cloth desired, or state the purpose for which it is required. Specify whether plain or galvanized wire is wanted and if galvanized if before or after woven.

MESH

The word "mesh" in Wire Cloth means the number of penings per lineal inch, measured from center to center of wire, as shown on illustration herewith. This cut shows 3 mesh, No. 13 gauge.

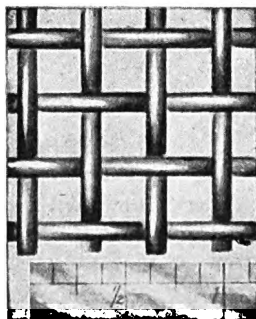


FIG. 2137

SPACE

The term "space" indicates the actual size of openings between the wires. It is usually expressed in fractions of an inch. This cut shows $\frac{3}{8}$ " space, No. 11 gauge.

GAUGE

The "Washburn and Moen Gauge" is the standard for Iron, Steel, Galvanized and tinned "Old English" gauge for Brass, Copper and Bronze Wire Cloth. For wire gauges, see page 654.

100 lineal feet is considered a full roll.

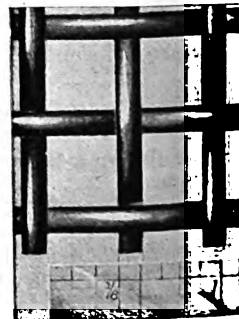
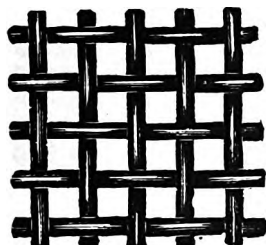
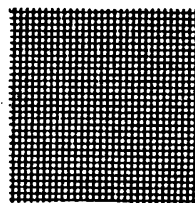


FIG. 2138

WIRE CLOTHFIG. 2137 $\frac{1}{2}$ FIG. 2138 $\frac{1}{2}$ **BRASS AND COPPER WIRE CLOTH****ALL GRADES**

The mesh is the distance from center to center of wire.
No length less than 100 feet shall be considered a roll.

No. of Meshes per in.	2	3	4	5	6	8	10	12	14	16	18	20	24	30	40
No. of Wire.....	16	17	18	19	20	22	23	24	25	26	27	28	30	32	34
Price, per sq. ft.....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....

STEEL WIRE CLOTH**HEAVY GRADE STEEL CLOTH FOR COAL, GRAVEL AND SAND SCREENS**

Size of Space, in.....	1	$\frac{3}{4}$	$\frac{5}{8}$	$\frac{1}{2}$	$\frac{3}{8}$	$\frac{1}{4}$
Wire No.....	6	7	8	9	10	12
Price per square foot.....	....	....	....	....	....	....

Widths, 24, 30, 36 and 48 inches.

The above and larger meshes of different size wires made to order up to 96 inches wide.

HEAVY MACHINERY OR LIGHT MINING GRADE

Mesh, Nos. per inch.....	2	2 $\frac{1}{2}$	3	4	5	6	7	8	9	10	12
Wire, No.....	10	11	12	14	15	16	17	18	19	20	21
Price per square foot.....	....	....	....	....	....	....	....	....	....	....	....

Widths, 24, 30, 36 and 48 inches.

RIDDLE GRADE STEEL WIRE CLOTH

Mesh Nos. per inch.....	2	3	4	5	6	8	10	12	14	16	18	20
Wire No.....	16	18	20	21	22	24	26	27	29	31	32	34
Price per Square Foot.....	....	....	....	....	....	....	....	....	....	....	....	....

Widths 24, 30 and 36 inches.

HEAVY FOUNDRY OR LIGHT MACHINERY GRADE WIRE CLOTH

Mesh Nos. per inch.....	2	2 $\frac{1}{2}$	3	4	5	6	7	8	10	12	14	16	18	20
Wire No.....	12	13	14	16	17	18	19	20	22	23	24	26	27	28
Price per Square Foot.....	....	....	....	....	....	....	....	....	....	....	....	....	....	....

Widths 24, 30, 36 and 48 inches.

FOUNDRY GRADE STEEL WIRE CLOTH

Mesh Nos. per inch.....	2	3	4	5	6	8	10	12	14	16	18	20
Wire No.....	14	16	18	19	20	22	24	25	26	28	29	31
Price per Square Foot.....	....	....	....	....	....	....	....	....	....	....	....	....

Widths 24, 30, 36 and 48 inches.

PERFORATED METAL SCREENS

ALL THICKNESS OF TIN, COPPER, BRASS, IRON, STEEL AND ZINC PERFORATED IN ANY DESIRED SIZE

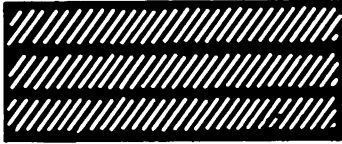


FIG. 2139
ANGLE CLEAR SLOT
 $\frac{1}{4}$, $\frac{1}{2}$, & $\frac{3}{4}$ INCHES LONG

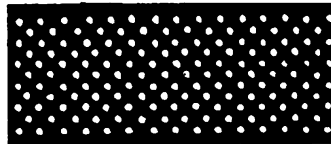


FIG. 2140
NEEDLE PUNCHED



FIG. 2141
ANGLE BURR'D SLOT
 $\frac{1}{4}$, $\frac{1}{2}$ & $\frac{3}{4}$ INCHES LONG

BATTERY SCREENS

Clear & Burr'd Slot Number.....	3	4	5	6	7	8	9	10	11	12
Price per Sq. Ft.....										
Equal to Number, Wire Cloth.....	15	20	25	30	35	40	45	50	55	60
Needle Punched No.....	1	2	3	4	5	6	7	8	9	..
Price per Sq. Ft.....										

We can also furnish steel screens and can punch round and oblong holes any given size. When ordering give full length and width, and which way the material runs over with the screen.

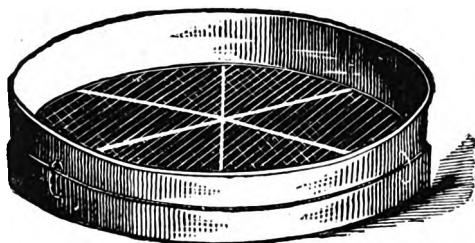


FIG. 2142

FOUNDRY RIDDLES

ELM RIMS, WITH OR WITHOUT CROSS BARS

GALVANIZED WIRE

18 inches dia., 2 to 16 mesh, in stock. 20 inches dia., made to order.
Price per dozen.....

BRASS WIRE

18 inches dia., 2 to 24 mesh, in stock. 20 inches dia. made to order.
Price per dozen.....
We can also furnish to order 16 and 24 inches diameter in Galvanized and Brass Wire.

TYLER STANDARD SCREEN SCALE TESTING SIEVES

MADE TO A FIXED RATIO

The Tyler Standard Screen Scale Sieves have been constructed from wire cloth, specially prepared, with accurately measured openings that increase and decrease throughout the series in a fixed ratio. The Screen Scale has as its base an opening of .0029 inches which is the opening in 200 mesh .0021 wire—the standard sieve as adopted by the Bureau of Standards.

The diameter of the openings as shown in the table increase in the Rittinger ratio of the square root of 2 or 1.414, making the area of each sieve in the scale just double that of the next finer or half that of the next coarser.

The Tyler Standard Screen Scale Sieves divide the tested product in much better proportion than a Sieve series with no relationship between the openings. Specially ruled paper is furnished in connection with the Sieves for making either a cumulative direct plot or a cumulative logarithmic plot showing a graphic illustration of screen analysis.



FIG. 2143

No.	Opening in Inches Ratio $\sqrt{2}$ or 1.414	Opening in Millimeters	Mesh	Diameter Wire, Decimal of an Inch	Brass Frames Covered with Brass Wire Cloth				
					6-Inch Diameter, List Price Each	7-Inch Diameter, List Price Each	8-Inch Diameter, List Price Each	10-Inch Diameter, List Price Each	12-Inch Diameter, List Price Each
1	1.050	26.67	....	.149					
2	.742	18.85	....	.135					
3	.525	13.33	....	.105					
4	.371	9.423	....	.092					
5	.263	6.680	3	.070					
6	.185	4.699	4	.065					
7	.131	3.327	6	.036					
8	.093	2.362	8	.032					
9	.065	1.651	10	.035					
10	.046	1.168	14	.025					
11	.0328	.833	20	.0172					
12	.0232	.589	28	.0125					
13	.0164	.417	35	.0122					
14	.0116	.295	48	.0092					
15	.0082	.208	65	.0072					
16	.0058	.147	100	.0042					
17	.0041	.104	150	.0026					
18	.0029	.074	200	.0021					

Prices on Application

SHOES, DIES, BOSSHEADS, CAMS AND TAPPETS



FIG. 2172

SHOE

When ordering state:
Height of Shoe to Neck.
Height of Neck.
Diam. of Neck at Base.
Diam. of Neck at Top.
Diameter of Shoe.

We can furnish shoes, dies, boss heads, cams and tappets as well as all other parts for Stamp Mills.

Prices upon application.

When ordering parts please give complete information regarding sizes, also type and size of the machines for which they are ordered.

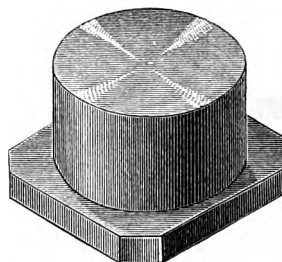


FIG. 2173

DIE

When ordering state:

Diameter of Die.
Depth over all.
Depth of Flange.
Distance across Flange in both Directions.
Length of Edge of Flange.

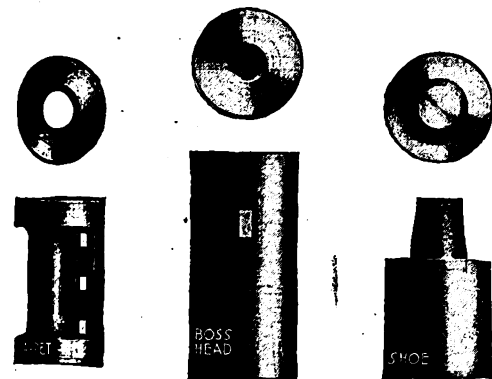


FIG. 2174



FIG. 2175

STEEL RING DIES AND ROLLER SHELLS

FOR HUNTINGTON AND CHILEAN MILLS

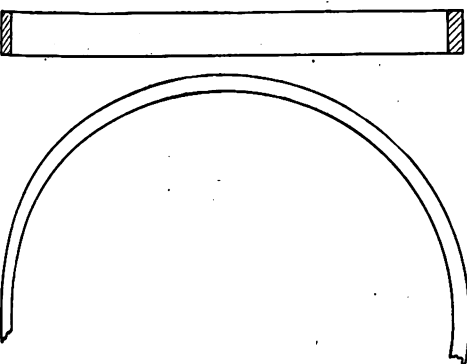


FIG. 2176

We can furnish Steel Ring Dies and Roller Shells for all types of Huntington and Chilean Mills.

When ordering ring dies or roller shells always specify size of mill.

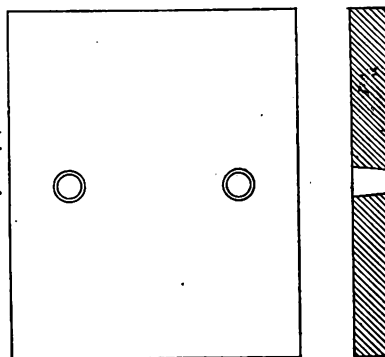


FIG. 2177

JAW AND CHEEK PLATES

FOR ROCK AND ORE CRUSHERS

We can furnish jaw and cheek plates for all makes of Breakers and Crushers. We carry in stock jaw plates and cheek plates for the Improved Dodge Crusher, sizes numbers 1, 2 and 3 and Dodge Giant Crushers, sizes 8" x 10" and 9" x 15".

When ordering jaw or cheek plates please furnish sketch giving all dimensions and details of the plates required as well as the size and make of the machine for which they are ordered.

Jaw Plate
FIG. 2178

FIG. 2179

BLASTING MACHINES, CAPS, WIRE AND FUSE

BLASTING MACHINES PUSH DOWN TYPE

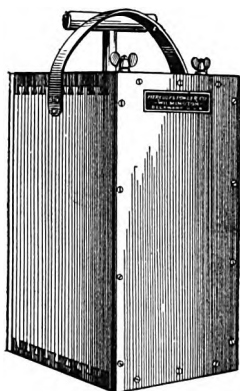


FIG. 2160

For firing electric blasting caps.

No. 2, Capacity 10 Holes. Price.....each \$.....
" 3, Capacity 30 Holes. Price....."

BLASTING CAPS



"CALIFORNIA" BLASTING CAPS

FIG. 2161

These blasting caps are made in two strengths, No. 6 and No. 8 and are packed in tin boxes containing 100 caps. They are used to detonate dynamite and are exploded by a spark from the fuse. Prices upon application.

NO. 6 ELECTRIC BLASTING CAPS



FIG. 2132

These electric caps have wires from 4 feet to 20 feet in length and are exploded by an electric current.

Prices upon application.

LEADING WIRE

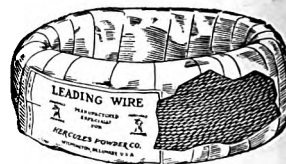


FIG. 2163

The wire commonly used for connecting electric fuses to the blasting machine is known as leading wire. It is insulated copper wire (No. 14 Brown & Sharpe gauge) and is furnished in coils of 250 and 500 feet.

Prices upon application.

CONNECTING WIRE



FIG. 2164

Connecting Wire is insulated copper wire (No. 20 Brown and Sharpe gauge). It is put up in 1 pound and 2 pound spools containing approximately 250 and 500 feet.

Connecting Wire is used to join the wires of the electric fuses together, when they are not long enough to reach between the adjoining bore holes. The ends of the connecting wire must be scraped bright before connections are made, and the joints should not be permitted to lie in water or on wet ground. If this cannot be prevented, the joint should be covered with insulating tape.

Price upon application.

COMET AND ECLIPSE SPECIAL FUSE

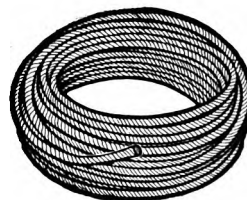


FIG. 2165

COMET BRAND FUSE

This is a double countered cotton covered fuse and can be used under all ordinary mining conditions.

ECLIPSE SPECIAL FUSE

This is a high grade, double countered fuse, is absolutely waterproof and very good where tamping is used, or where snow is to be considered.

Prices upon application.

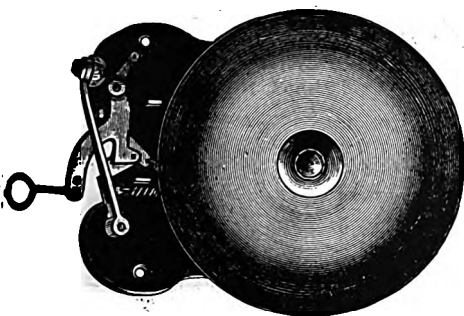


FIG. 2166

Gong, inches.....	3	4	5	6	8	10
Price, each.....	\$1.45	1.80	2.50	3.00	5.00	6.40

LOCOMOTIVE GONGS**POLISHED BELL METAL**

Diam. inches.....	5	6	8	10	12
Price, each.....	\$4.00	5.00	9.50	17.00	29.00



FIG. 2167

GONG BELLS**POLISHED BELL METAL**

Gong, inches.....	3	4	5	6	8	10
Price, each.....	\$1.45	1.80	2.50	3.00	5.00	6.40



FIG. 2168

AMALGAM TRAPS

It is usual and very desirable to place at the foot of the last copper plate an arrangement for catching any stray particles of mercury that may have escaped with the pulp. The usual form of trap (see illustration) consists of a cast-iron box, into which the pulp is allowed to flow, the construction being such that the pulp must go to the bottom of the box and then rise again before it can escape. The heavier particles, and among them mercury, will collect in the bottom of the box, the lighter portions of the pulp flowing away. The contents of the box are emptied out from time to time and put aside for special treatment. Prices upon application.

MINERS' DRILL SPOON**WROUGHT STEEL—HAND MADE**

¼" Pods, Lengths 36, 42 and 48 inches. Price, each.....	\$0.65
½" Pods, Lengths 36, 42 and 48 inches. Price, each.....	.75



FIG. 2169

BULLION MOULDS

For large bars, round corners. The dimensions given below are inside measures.

Capacity in Gold Ounces	Capacity in Silver Ounces	Measures, Inches	Price Each
28	15	2 1/4 x 1 3/8 x 1 1/8	\$0.70
48	20	3 x 1 3/4 x 1 1/4	1.00
96	40	4 1/8 x 1 3/4 x 1 1/4	1.50
150	80	4 3/4 x 2 5/8 x 1 1/8	2.00
200	107	5 x 2 3/4 x 2	2.50
300	160	5 3/4 x 3 1/4 x 2 1/4	4.00
500	275	7 1/4 x 3 x 2 1/8	5.00
1000	575	9 3/4 x 4 3/8 x 4	6.00
1850	1000	11 1/4 x 5 1/4 x 5	10.00
3040	1600	18 x 6 x 5 3/4	15.00



FIG. 2170

QUICKSILVER RETORTS**NEVADA OVAL TOP. WITH PIPE AND FITTINGS**

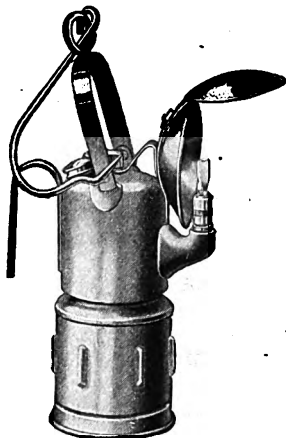
Capacity, pints.....	1	2	3	4	5	6	10
Capacity, lbs.....	12 1/2	25	38	50	63	75	125
Weight, lbs.....	10	15	18	25	31	44	65
Price, each.....	\$7.00	8.50	10.00	12.00	13.50	16.00	18.50



FIG. 2171

I. T. P. CARBIDE MINE LAMPS

FLAT FLAME LAMP
FOR DRILLING AND STOPE WORK
POLISHED STEEL



NO. 210—FIG. 2207

HORIZONTAL FLAME LAMP
FOR DRILLING AND STOPE WORK
POLISHED STEEL



NO. 205—FIG. 2208

Equipped with sparker lighter and windshield.
Lava Burner—Rigid Removable Reflector.

SUPERINTENDENTS LAMP
BRASS, NICKEL PLATED



NO. 160—FIG. 2209

Equipped with wind-shield.

Lava Burner—Rigid Removable Reflector.

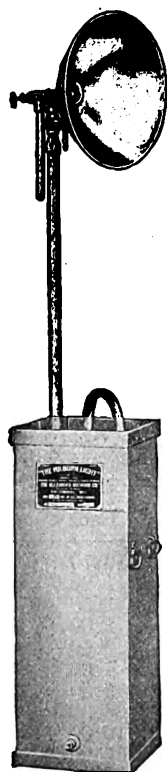


FIG. 2210

THE NEW MILBURN CARBIDE LIGHT

THE NO. 8—5000 CANDLE POWER

Guaranteed to burn 12 hours on 8 pounds of carbide. Equipped with reflectors 12 inches diameter, steel, white enameled and non-tarnishing. It is only necessary to wipe to keep them clean. Can also be equipped with all-aluminum reflectors for intense lighting. This light burns automatically, either continuously or intermittently without loss of gas. These results are obtained by the perfect control of the new feed.

Has indestructible Vanadium steel burner cleaner operating from rear while light is burning. Specify whether enamel or aluminum Reflector wanted when ordering.

RELIANCE—1000 CANDLE POWER

The Reliance 1000 Candle Power is the same type as the No. 8 Milburn. Fitted with all-aluminum reflector.

SMALL PORTABLE CARBIDE FLARE LIGHT BUILDER

Indispensable as inspection lamp for Mines, Tunnels, Sewers and General Repair Work.

Burns 12 hours on one charge, 200-300 candle power
Carbide Charge 2 pounds.

7x14 inch Body—10-inch Reflector.



FIG. 2211

PRICE LIST OF LAMPS AND FLARE LIGHTS

No.	Height of Lamp.	Height to Top of Bail	Description	Burns on one charge hours	Weight	List Price
8	6 Ft.	.....	Equipped with white enameled steel or all-aluminum reflector..	12	85 lbs.	\$94.00
Reliance	5 Ft.	.....	All-Aluminum Reflector.....	12	55 lbs.	47.00
160	5 1/4 In.	.....	Seamless Drawn Brass, heavily nickel-plated, with large hook..	6	11 oz.	4.00
205	6 1/2 In.	9 3/4 In.	With bail and hook.....	10	19 oz.	4.70
210	7 In.	10 1/4 In.	With bail and hook.....	6 1/2	2 lbs.	5.30
234	14 In.	.....	With hook and handle.....	12	10 lbs.	18.00

JUSTRITE CARBIDE MINE LAMPS

Drawn from seamless brass. Attached parts are riveted and soldered inside. Deep concave. Reflector is part of the lamp, cannot get loose or be broken off. Equipped with lighter attachment.

THE SPIRAL WATER FEED

The new Spiral Valve Stem fits snugly in the water tube and forces the water to travel around the spiral a distance of 7 inches, while in other lamps it travels in a straight course only $1\frac{1}{4}$ inches. This increases the gas resistance about six times, prevents waste of gas and produces an even, steady burning flame. The valve stem can be lifted out, cleaned and returned in a few seconds.

CAP LAMPS—SPIRAL FEED

CAP LAMP LEVER FEED



NO. 85—FIG. 2189



NO. 124—FIG. 2190



NO. 154—FIG. 2191

SUPERINTENDENTS' LAMP

Also suitable for engineers, surveyors, inspectors, shift-bosses, etc.



NO. 95—FIG. 2196

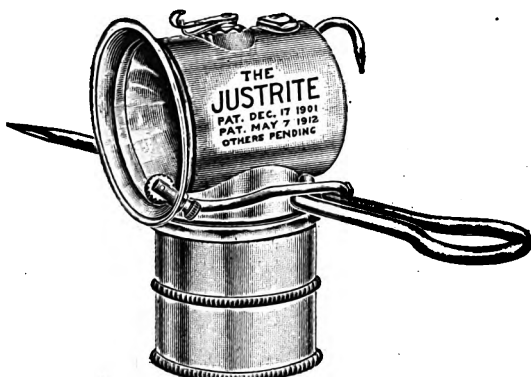
ARIZONA SPECIAL



NO. 83—FIG. 2194

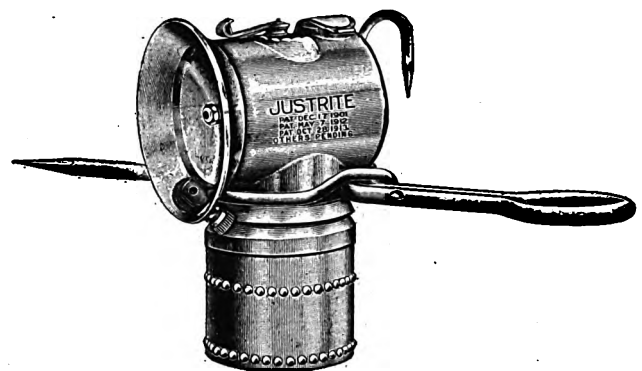
ANACONDA SPECIAL

18 CANDLEPOWER, BURNS 6 HOURS



NO. 93—FIG. 2192

HALF-SHIFT LAMP LEVER FEED VALVE CONTROL



NO. 103—FIG. 2193

Equipped with No. 28 Jewel Tip.

The No. 93 is larger than the half-shift lamp No. 103. It is made of 24 Gauge Brass with a longer candlestick. Sides of carbide container are straight, knurled at center and bottom. Equipped with No. 28 Jewel Tip.

JUSTRITE CARBIDE MINE LAMPS



FIG. 2195

CARBIDE CONTAINERS

POCKET CARBIDE CAN

Made of light steel, tin coated, ribbed, double seamed and sliding cover, air tight, concaved to fit the boot or hip pocket. Holds full day's supply.

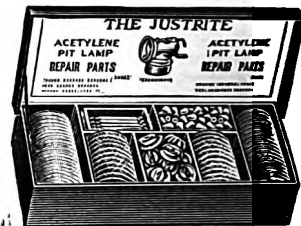


FIG. 2197

REPAIR OUTFITS

Outfits Nos. 1 and 2 are packed in heavy cardboard boxes covered with waterproof paper, reinforced corners. Strong and durable.

Outfit No. 3 is packed in handsome metal show case with glass cover and drawer opening from back. White enamel finish.

CONTENTS

NO. 1 ASSORTMENT

Part No.	Name of Part	No. in Outfit, doz.
60	Gaskets	6
62	Felts	6
64	Felt Holders	1
66	Lava Tips	3
28	Metal Tips	3
172	Flints	3
173	Springs	1
174	Screw Caps	1
182	Hexagon Nuts	1
177	Lighters comp.	1/2
37	Tip Cleaners	2

NO. 2 ASSORTMENT

Contains same articles as No. 1 Box, approximately one-half quantity.

NO. 3 ASSORTMENT

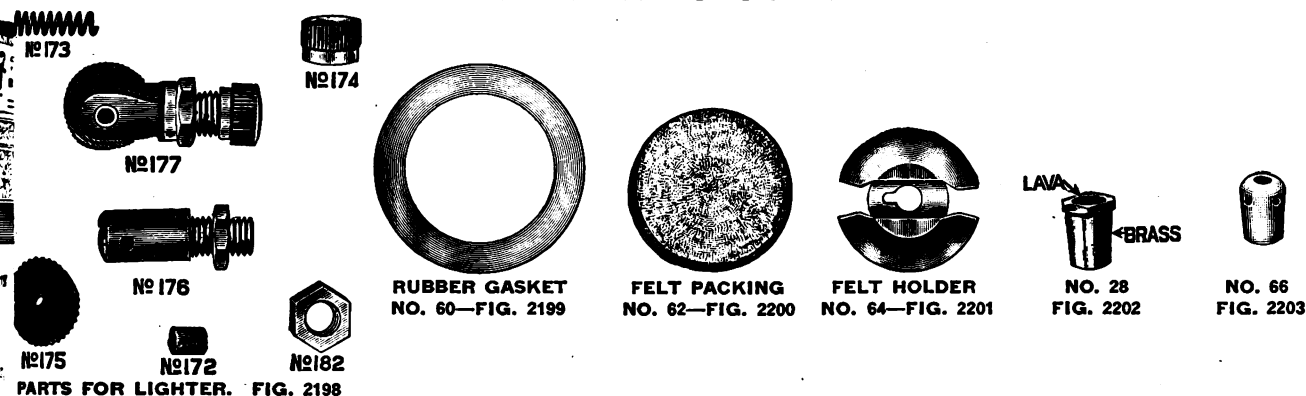
Part No.	Name of Part	No. in Outfit
60	Gaskets	100
62	Felts	100
64	Felt Holders	12
66	Tips	144
28	Tips	100
22	Tip Cleaners	24
37	Tip Cleaners	48
16	Wires	72
78	Valve Stems	9
145	Reamers	36
177	Lighters	12
172	Flints	24
173	Springs	12
174	Screw Caps	12
176	Forks and Nuts	12
181	Water Caps	12
182	Hexagon Nuts	12
113	Valve Stems	4

PRICE LIST OF LAMPS AND REPAIR OUTFITS

No.	Height Inches	Description	Weight	Capacity		Candle Power	List Price Each
				oz.	Car-bide inches		
83	5 3/4	Polished Brass with Bail & Hook.....	1 lb.	4	1/4	18	\$ 4.50
85	4	Polished Brass with Round Hook, 2 1/4 inch Reflector and No. 77 Carbide Can.....	5 oz.	2	1/4	16.7	1.50
93	5 3/4	Polished Brass with Candlestick.....	1 lb.	4	1/4	18	4.50
95	4 3/4	Nickel Plated Highly Polished, with Handles, 3 inch Reflector and No. 76 Carbide Can. Lighting attachment.....	7 oz.	3	1/4	20	3.00
103	4 3/4	22 Gauge Polished Brass, heavy, with candlestick; 2 1/2 inch Reflector.....	5 1/2 oz.	3	1/4	18	3.00
124	4	Polished Brass, With Round Hook and No. 77 Carbide Can, 2 1/4 inch Reflector.....	5 oz.	2	1/4	16.7	1.90
154	4	Polished Brass with Round Hook and No. 77 Carbide Can, 2 5/8 inch Reflector.....	5 oz.	2	1/4	16.7	1.90
76		Carbide Container, capacity 7 oz.....					.30
77		Carbide Container, capacity 10 oz.....					.30
1		Repair Outfit Assortment, large size.....					13.00
2		Repair Outfit Assortment, small size.....					7.50
3		Repair Outfit Assortment.....					38.00

JUSTRITE CARBIDE MINE LAMPS AND LANTERNS

REPAIR PARTS AND SUPPLIES



72 Flints,
 73 Springs
 74 Caps,
 75 Wheels,

No.
 176 Fork & nut
 177 Lighter complete
 182 Hex. Nut

No. 66—Lava Tip with Air Holes.

No. 28—Jewel Metal Tip. A perfect Metal Tip. Shell made of brass with an imported Lava Burner insert, combining the best qualities of the metal and lava tip—cannot break or crack—easy to put in and take out.

WIRE BRUSH CLEANERS

Fifty hard, rust-proof steel wires; sliding cover. Protects wires when not in use.



CLOSED



OPEN

NO. 37—FIG. 2204



NO. 22 FIG. 2205
 NO SLIDING COVER

PRICE LIST OF SUPPLIES AND PARTS

PRICE LIST OF SUPPLIES AND PARTS			
No.	Name of Part	Fitting Lamps Nos.	
		85, 95, 103 124, 154	83 & 93
		Price per dozen.	
60	Gasket Flat Rubber.....	\$0.72	.....
90	Gasket Flat Rubber.....	.....	\$2.40
62	Felt Packing for filtering gas.....	.72	.....
97F	Felt Packing for filtering gas.....	.....	1.20
64	Felt Holders.....	1.20	.....

SUPPLIES FOR LIGHTER ATTACHMENT

172	Flints.....	1.20	1.20
173	Springs.....	.72	.72
174	Screw Caps.....	1.20	1.20
175	Wheels.....	1.20	1.20
176	Fork and Nut.....	1.20	1.20
182	Hexagon Nuts.....	.48	.48
177	Lighter, complete.....	2.40	2.40

BURNER TIPS

66	Lava with air holes.....	.72	.72
18	Lava without air holes.....	.72	.72
28	The Jewel Metal Shell Lava Insert.....	1.20	1.20

ACCESSORIES

22	Tip Cleaners, Wire Brush, open.....	1.20	1.20
37	Tip Cleaners, Wire Brush, closed.....	2.40	2.40

JUSTRITE ACETYLENE LANTERN

No. 10.

Automatic Generator Controls the Gas.

The only automatic generating acetylene lantern. Will not blow out.

Gives a 20-candle-power light. Burns 5 to 6 hours with 3 ounces of carbide. Flame is controlled by the valve and can be turned high or low or extinguished as desired. Made of brass throughout, nickel plated and highly polished. Equipped with detachable Bullseye Lens and German Silver Reflector. No complicated parts to get out of order and very easy to operate.

A great "trouble light" for the automobile. Can be used as a headlight. Throws a strong light 200 feet. Packed in round metal case. Can be carried in tool box or under seat without breaking.

Superior to any portable light in cleanliness, safety and candle-power. No smoke or grease.
 List Price each..... \$9.00

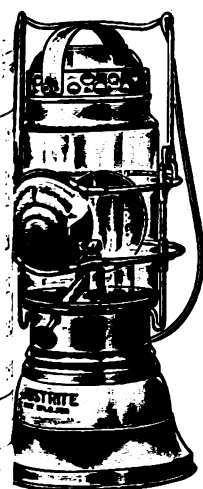


FIG. 2206

THE EASY CAR PUSHER

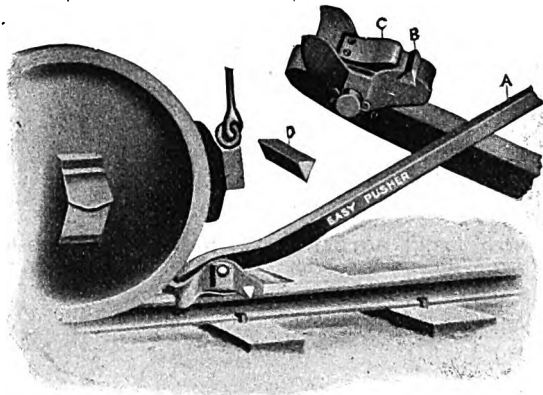


FIG. 2188

It will work on any track and under any brake. Rough, greasy, icy or wet rails do not affect it. Is made of the best material. The bar "A" is Steel; the shoe is malleable; the bit "D" is of the finest TOOL STEEL, the Spring "C" is also of fine steel. Weight, 20 lbs. Length, 5½ ft.

As shown in the cut, the heel has lugs extending downward on both sides of the rail so as to hold it firmly in position and prevent slipping sideways. The triangular steel bit cuts into the rail when pressure is applied and prevents slipping backward even though the rail is ICY, GREASY OR WET.

This bit can be inverted. Each one has three sharpened edges.

When pressure is released, THE STEEL SPRING lifts the steel bit from the rail, thus preventing it from being dulled by sliding over the rail when following the wheel.

Two triangular steels with each pusher.

Price each..... \$7.50

Extra Steels, Price each..... .30

RAIL TONGS

Opening to accommodate a 6-inch girder rail.

Distance across handles 3 ft. 3 in.; greatest opening 4¼ in.

Weight each, 18 lbs. Price each..... \$6.00

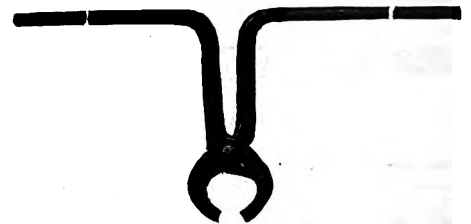


FIG. 2072

RAIL BENDERS

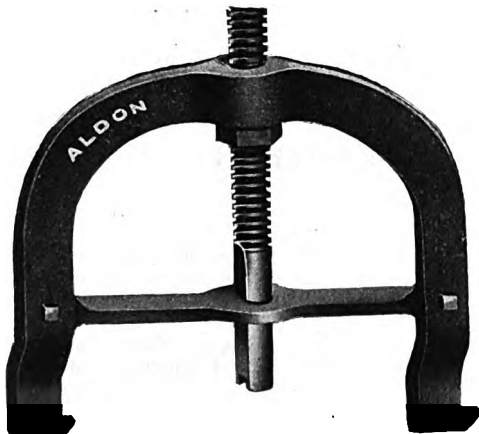


FIG. 2073

No.	For Rails Pounds	Span of Hooks, Inches	Weight Each, Pounds	Price Each
00	16	14	40	\$24.00
1	25	16	65	36.00
2	50	20	85	48.00
3	75	24	110	72.00

STEEL T RAILS

We can supply Rails of various weights, spikes, splices, bolts, turning plates, switches and frogs.

Weight of rail per yard, lbs.	Weight per Mile Tons	Weight per Mile lbs.	Size of Spikes, in.	No. of Spikes per lb.	Weight of Splices per pair, lbs.	Size of Bolts, inches	No. of Bolts per lb.	Price Rail per ton
8	12	1280	$\frac{1}{8} \times 2\frac{1}{2}$	11	2	$\frac{3}{8} \times 1\frac{1}{2}$	9	.....
12	18	1920	$\frac{3}{8} \times 2\frac{1}{2}$	$7\frac{1}{2}$	$2\frac{1}{2}$	$\frac{3}{8} \times 1\frac{3}{4}$	$8\frac{1}{2}$	.....
16	25	320	$\frac{3}{8} \times 3$	7	$3\frac{1}{2}$	$\frac{3}{8} \times 2$	8	.....
20	31	960	$\frac{3}{8} \times 3\frac{1}{2}$	$6\frac{1}{2}$	$4\frac{1}{2}$	$\frac{1}{2} \times 2$	4	.....
30	47	320	$\frac{1}{2} \times 4$	3	10	$\frac{5}{8} \times 2\frac{3}{4}$	$1\frac{3}{4}$	.....

FIG. 2180

FISH PLATES AND BOLTS

A set consists of two plates and four bolts.

for Rails, lbs.....	8	12	16	20	30
Size Bolt, in.....	$\frac{3}{8} \times 1\frac{1}{2}$	$\frac{3}{8} \times 1\frac{3}{4}$	$\frac{3}{8} \times 2$	$\frac{1}{2} \times 2$	$\frac{5}{8} \times 2\frac{3}{4}$
Wt. per set lbs.....	2.19	3.50	4.00	6.80	8.30
Price per set.....	.....	.....	.....	.....	.....



FIG. 2181

NUMBER OF COMPLETE JOINTS TO THE TON OF RAILS

Weight of Rails per yd., lbs	8	12	16	20	30
Length of rails, feet.					
24	35.00	23.33	17.50	14.00	9.83
26	32.30	21.53	16.15	12.92	8.60
28	31.10	20.74	15.55	12.44	8.29
30	28.00	18.66	14.00	11.20	7.46
30 with 10 shorter	28.67	19.09	14.33	11.25	7.64

FISH PLATES AND BOLTS REQUIRED FOR ONE MILE SINGLE TRACK

Length of Rail, feet	All 21	All 24	All 26	All 28	All 30	90% 30, 10% shorter
Complete joints	503	440	406	377	352	358

Each joint consists of two plates and four bolts and nuts.

CROSS TIES PER MILE

Dis. from center to center, ins..	18	21	24	27	30
Ties.....	3520	3017	2640	2348	2113

WROUGHT RAILROAD SPIKES



FIG. 2182

RAILROAD TRACK BOLTS



FIG. 2183

Size, inch.....	$\frac{1}{8} \times 2\frac{1}{2}$	$\frac{3}{8} \times 2\frac{1}{2}$	$\frac{3}{8} \times 3$	$\frac{3}{8} \times 3\frac{1}{2}$	$\frac{1}{2} \times 4$	Size inch...	$\frac{3}{8} \times 1\frac{1}{2}$	$\frac{3}{8} \times 1\frac{3}{4}$	$\frac{3}{8} \times 2$	$\frac{1}{2} \times 1\frac{1}{4}$	$\frac{1}{2} \times 2$	$\frac{1}{2} \times 2\frac{1}{2}$	$\frac{3}{4} \times 2\frac{3}{4}$	$\frac{5}{8} \times 3$
o. in 100 lbs.....	1088	778	692	590	490	Wt. lbs. per 100.....	10	11	12	18	20	23	43	46
Price per 100 lbs....	.....	.....	..	.....	.....	Price per 100	.....	.....	.....	.....	.....	.....	.....	.....

PLATE STEEL TURNING PLATES

For turning cars, when revolving turntables are not used. Made of $\frac{1}{4}$ -inch steel with forged steel points.

Gauge of Track, in.....	18	24	30
Size of plate, ft.....	3x3	$3\frac{1}{2} \times 3\frac{1}{2}$	4x4
Weight, lbs.....	125	140	180
Price, with two sets rail points.....	.....	.....	.....
Price, with three sets ditto.....	.....	.....	.....
Price, with four sets ditto.....	.....	.....	.....

FIG. 2183½

STANDARD SWITCHPOINTS

The opposite illustration shows the Standard Split Switchpoints, which we furnish straight throughout the requisite length, so that they can be used for right and left-hand switches.

We also supply Spring Split Switchpoints when ordered.

Important: When ordering switchpoints kindly state the gauge of track.



FIG. 2184

STANDARD RIVETED PLATE FROGS

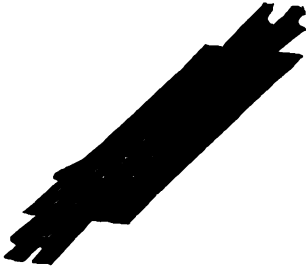


FIG. 2185

Our Standard Frogs as shown in this cut are securely riveted to a heavy base plate, which effectually prevents any of the parts getting out of line. They are supplied straight throughout the requisite length, so that they can be used either for right, left-hand or symmetrical switches.

When ordering frogs kindly specify the number or angle of frog desired, or tell us the radius of turnout desired and we will advise the proper number.

Guard rails are supplied by us if specially ordered.

SELF-OILING CHILLED CAR WHEELS AND AXLES

We can supply self-oiling chilled Car Wheels with malleable dust caps and square axles or with round axles and half babbitted boxes—18 Gauge track.

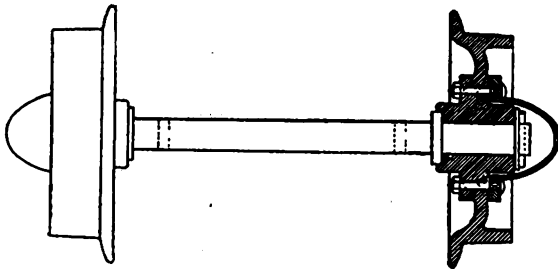


FIG. 2186

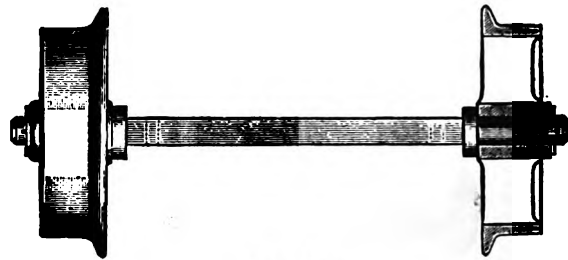


FIG. 2187

SELF-OILING CHILLED CAR WHEELS WITH DUST CAPS AND AXLES

WEIGHT PER SET 2 Axles—4 Wheels 4 Boxes		LIST PRICE PER SET 2 Axles—4 Wheels, 4 boxes	
Round	Square	Round	Square
95	95	\$17.50	\$17.50
135	110	22.50	19.50
140	120	23.00	21.00
185	175	26.50	24.00
225	210	30.00	28.00
235	225	32.00	30.00
295	280	38.50	37.00
305	290	40.00	38.00

Allow 25 cents each for dust caps if not required on all sizes except 6 inch diameter. For gauges exceeding 18 inches add 35 cents per set for each 6 inches or less.

SELF-OILING CHILLED CAR WHEELS WITH DUST CAPS WITHOUT AXLES

Diam. of Wheels Inches	Face of Wheels Inches	Size of Bore Inches	Weight Each Pounds	List Price Each
* 6	2	1 1/4	14	\$1.80
8	2	1 1/4	22	3.50
8	2	1 1/2	22	3.50
10	2 1/4	1 1/2	36	4.60
12	2 3/4	1 1/2	45	5.20
12	2 3/4	1 3/4	45	5.20
14	2 3/4	1 1/2	63	7.50
14	2 3/4	1 3/4	63	7.50

Allow 25 cents each for dust caps if not required on all size except 6-inch dia.

* 6-inch Wheels furnished only without Dust Caps.

Other sizes of Wheels and Axles furnished.

Prices on application.

WATER GAUGES**TWO GUARDS**

Size, inch	Style	Wheels	Glass, inch	Price, Each
$\frac{3}{8}$	Rough Body	Iron	$\frac{5}{8} \times 10$	\$2.75
$\frac{1}{2}$	Rough Body	Iron	$\frac{5}{8} \times 12$	3.00
$\frac{1}{2}$	Finished	Wood	$\frac{5}{8} \times 12$	4.25
$\frac{3}{4}$	Rough Body	Wood	$\frac{3}{4} \times 16$	5.00

FOUR GUARDS

$\frac{1}{2}$	Finished	Wood	$\frac{5}{8} \times 12$	5.25
$\frac{3}{4}$	Finished	Wood	$\frac{3}{4} \times 16$	6.25
$\frac{3}{4}$	Finished	Wood	$\frac{3}{4} \times 16$	8.00

PENBERTHY SAFE GUARD, AUTOMATIC

The Automatic Devices will not stick or become corroded. The brass balls must go automatically to seat when blast breaks. Blow-off is operated by gauge handle. Seats of valve can be re-ground.

Size Shank, inches.....	$\frac{1}{2}$	$\frac{3}{4}$
Size Glass, inches.....	$\frac{5}{8} \times 14$	$\frac{3}{4} \times 16$
Price, each.....	\$5.00	\$6.50

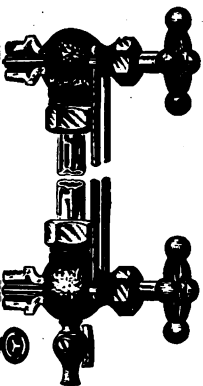


FIG. 2212
TWO GUARDS

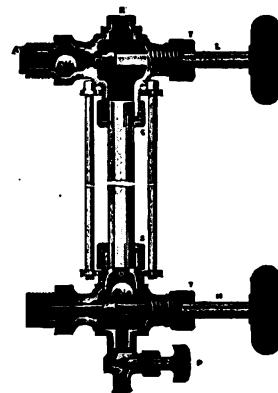


FIG. 2213
SAFE-GUARD AUTOMATIC

GENUINE SCOTCH GAUGE GLASSES

FIG. 2214

GENUINE MONCRIEFF**UNIFIC HIGH-PRESSURE (Same Grade as Rhenag)**

Length	External Diameter, inch						
	$\frac{1}{2}$ and $\frac{5}{8}$	$\frac{3}{4}$	$\frac{7}{8}$	1	$\frac{1}{2}$	$\frac{5}{8}$	$\frac{3}{4}$
10 inches	\$3.00	\$3.60	\$ 5.04	\$ 6.12	\$3.48	\$ 4.56	\$ 5.64
12 inches	3.60	4.32	6.12	7.32	4.20	5.52	6.72
14 inches	4.20	5.16	7.08	8.52	4.92	6.36	7.80
16 inches	4.80	5.88	8.16	9.72	5.64	7.32	8.88
18 inches	5.40	6.60	9.12	10.92	6.36	8.16	10.08
20 inches	6.00	7.44	10.20	12.12	7.08	9.12	11.16
22 inches	6.60	8.16	11.16	13.44	7.80	10.08	12.24
24 inches	7.20	8.88	12.12	14.64	8.52	10.92	13.32

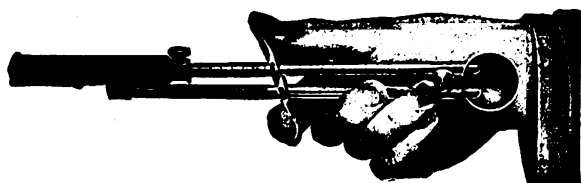
GAUGE GLASS CUTTER**CHESTERTON**

FIG. 2215

Nickel Plated. In this cutter the sliding lever can be placed close to the work, and thus more power obtained than in any other cutter and the steel cutting wheel can be used much longer than in any other cutter.

Price each..... \$2.50

PRESSURE AND VACUUM GAUGES

The materials in these Gauges are carefully selected and specially adapted to the service required of them. The workmanship is the same in all—the best only is employed.

These Gauges are not warranted for steam pressures unless equipped with a siphon of sufficient capacity to fill the spring with water and maintain the temperature of same below 140 degrees, Fahrenheit.

They are all accurately graduated by open mercury column and thoroughly inspected before leaving the Works.

For greatest durability, a gauge should be graduated to double its working pressure. It is, therefore, important that you specify a graduation bearing this relation to the working pressure. Where the gauge is to be of the Compound Type for the indication of pressure and vacuum, it is necessary to specify the point to which the pressure scale is to be graduated. The vacuum scale is regularly graduated to 30 inches, but if specified will be graduated to equivalent pounds. Silvered dials are regularly furnished for all gauges.

PRESSURE GAUGE—IRON CASE, BRASS RING—BRASS CASE

Service—For any pressure medium which will not deteriorate brass.

Construction—Made in Iron Case with Brass Ring and in Brass Deep or Shallow Case. The interior mechanism consists of a Single Spring and Standard Geared Movement. The connection is $\frac{1}{8}$ inch male bottom on the $2\frac{1}{2}$ inch size, and $\frac{1}{4}$ inch male bottom on all larger sizes.

VACUUM GAUGE—IRON CASE, BRASS RING—BRASS CASE

Service—For the indication of vacuum.

Construction—Made in Iron Case with Brass Ring and in Brass Deep or Shallow Case. The interior mechanism consists of a Single Spring—in reversed position—and Standard Geared Movement. The connection is $\frac{1}{8}$ inch male bottom on the $2\frac{1}{2}$ inch size and $\frac{1}{4}$ inch male bottom on all larger sizes.

Vacuum Gauges, unless otherwise specified, will always be furnished graduated to 30 inches. They can be graduated to equivalent in pounds instead of inches, if so stated when ordering.

PRICE LIST PRESSURE AND VACUUM GAUGES IRON AND BRASS CASE

Size Dial, inches.....	2½	3	3½	4½	5	5½	6	6¾	8½	10	12
Iron Case, Brass Ring.....	\$6.00	\$6.00	\$7.00	\$ 8.00	\$ 8.00	\$10.00	\$13.00	\$16.00	\$22.00	\$32.00	\$50.00
Brass Case.....	8.00	8.00	9.00	10.00	11.00	12.00	16.00	20.00	30.00	40.00	75.00
Standard Graduations of Dial pressures..	30, 60, 100, 160, 200				30, 60, 100, 160, 200, 300, 500				30, 100, 200, 300, 500		

PRESSURE AND VACUUM GAUGES—STEEL CASE HARD RUBBER FINISH

With spring-mounted glass to prevent breakage in handling.

For any pressure medium which will not deteriorate brass, and for vacuum, compound pressure and vacuum, and water altitude indication.

This gauge is admirably adapted for use on hot water systems.

Vacuum Gauges graduated to 30 inches of vacuum. Altitude Gauges regularly furnished graduated to 70 feet.

Furnished in sizes $2\frac{1}{2}$ inch to 5 inch only.

Altitude style furnished in $4\frac{1}{2}$ inch size only.

While this style gauge is regularly furnished without a flange on back for fastening to board, we can furnish in this manner with out extra charge.

PRICE LIST PRESSURE AND VACUUM GAUGES WITH STEEL CASE

Size Dial, inches.....	2½	3½	4½	5
Pressure or Vacuum.....	\$ 6.00	\$ 7.00	\$ 8.00	\$ 8.00
Compound Pressure & Vacuum.....	.....	10.00	12.00	14.00
Altitude.....	.....	.....	12.00	.....

Above prices (except $2\frac{1}{2}$ inch) include cock.

COIL PIPE SIPHONS

The Coil Pipe Siphon is recommended for general service in connection with Steam Gauges, except when it is necessary to drain itself entirely, or where vibration and other conditions prevail.

Iron pipe, $\frac{1}{4}$ inch threaded, Price each..... \$0.60
Finished Brass, $\frac{1}{4}$ inch threaded, Price each..... 2.00

TELESCOPIC JOINT

This telescopic joint supplies a convenient means for lifting a pump when blasting, and avoiding disconnecting the pipes. Usually made for sixteen foot travel, to enable the operator to drop the pump that distance without disturbing the rest of the pipe. By its use irregular lengths of pipe may be added, whereas otherwise, when the pump is lowered, the pipe would have to be cut in equal lengths.

Furnished in sizes $1\frac{1}{4}$ inch to 8 inches diameter and 16 foot travel.

Price on application.



VACUUM GAUGE
FIG. 2218



PRESSURE GAUGE
FIG. 2217

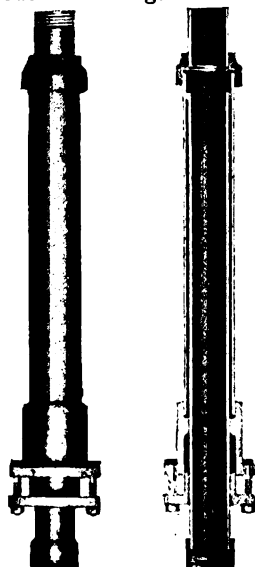


FIG. 2220
TELESCOPIC JOINT

FIG. 2221



FIG. 2219

BRASS AND IRON BODY EXPANSION JOINTS

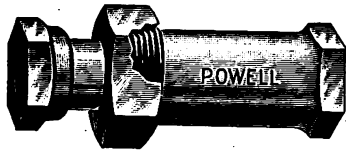


FIG. 2222
BRASS

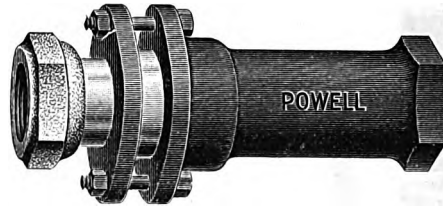


FIG. 2224
IRON BODY

BRASS—SCREWED, STANDARD TRAVERSE

Size.....inches	$\frac{1}{2}$	$\frac{3}{4}$	1	$1\frac{1}{4}$	$1\frac{1}{2}$	2	$2\frac{1}{2}$	3
Traverse.....inches	2	$2\frac{1}{4}$	$2\frac{1}{4}$	$2\frac{1}{4}$	$2\frac{1}{4}$	$2\frac{1}{2}$	$2\frac{1}{2}$	$2\frac{3}{4}$
Price.....each	\$1.50	2.20	2.75	4.00	5.00	8.00	17.50	24.00

IRON BODY—SCREWED, STANDARD TRAVERSE

Size.....inches	2	$2\frac{1}{2}$	3	$3\frac{1}{2}$	4	$4\frac{1}{2}$	5	6	7	8	9	10	12
Traverse....inches	$2\frac{1}{2}$	$2\frac{1}{2}$	$2\frac{3}{4}$	3	$3\frac{1}{4}$	$3\frac{1}{2}$	4	5	6	7	7	7	8
Price.....each	\$7.00	8.00	10.00	14.00	18.00	30.00	38.00	45.00	70.00	100.00	110.00	160.00	225.00

IRON BODY—FLANGED, STANDARD TRAVERSE

Size.....inches	2	$2\frac{1}{2}$	3	$3\frac{1}{2}$	4	$4\frac{1}{2}$	5	6
Traverse.....inches	$2\frac{1}{2}$	$2\frac{1}{2}$	$2\frac{3}{4}$	3	$3\frac{1}{4}$	$3\frac{1}{2}$	4	5
Diameter of Flanges....."	6	7	$7\frac{1}{2}$	$8\frac{1}{2}$	9	$9\frac{1}{4}$	10	11
Price.....each	\$15.00	16.00	18.50	25.00	30.00	40.00	48.00	55.00
Size.....inches	7	8	9	10	12	14	15	16
Traverse.....inches	6	7	7	7	8	10	10	10
Diameter of Flanges....."	$12\frac{1}{2}$	$13\frac{1}{2}$	15	16	19	21	$22\frac{1}{4}$	$23\frac{1}{2}$
Price.....each	\$80.00	110.00	120.00	175.00	250.00	500.00	550.00	600.00

C. H. & E. EXPANSION JOINT

FOR PIPE LINES

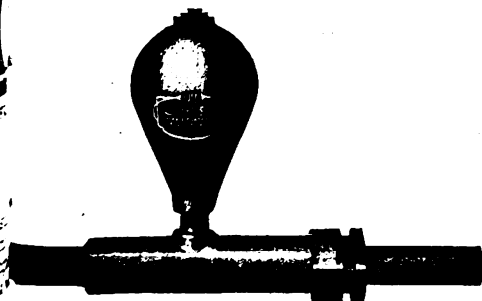


FIG. 5046

This expansion joint for pipe lines eliminates one of the greatest troubles of the road builder, namely the breakage of the pipe line due to expansion and contraction of the line caused by temperature changes. These expansion joints if located in the pipe line eight hundred to one thousand feet apart will positively prevent breakage. Each joint will allow for twelve inches of expansion and contraction. This is done by means of a brass pipe which telescopes into a casing through a gland or stuffing box. The pipe line is connected to each end of the joint which thus becomes a part of the line. We can furnish these expansion joints with an air chamber as shown to take up the water hammer in the line. If every second or third joint is equipped with this air chamber the water hammer will be reduced to a minimum. This will also prevent breakage of hose, etc., when the water is suddenly shut off at the mixer or at any point of the line and will cause a steadier flow of water.

Price complete with air chamber for $1\frac{1}{2}$ or 2 inch pipe.....
 Price without air chamber for $1\frac{1}{2}$ or 2 inch pipe.....

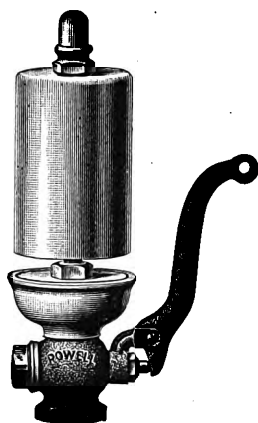


FIG. 2225
NO. 2 WITH ADJUSTABLE
LEVER VALVE

PLAIN STEAM WHISTLES

Diam of Bell—Inch....	1	1¼	1½	2	2½	3	3½	4	5	6	8
Size of Pipe Connection Inch.....	¼	¼	⅜	½	¾	¾	1	1¼	1½	1½	2
No. 2 with Lever Valve	\$4.65	5.65	6.00	8.25	9.75	12.75	17.25	22.50	33.75	49.50	142.50

SINGLE BELL CHIME WHISTLES

Diameter of Bell—Inch.....	1½	2	2½	3	3½	4	5	6	8
Size of Pipe Connection Inch.....	⅜	½	¾	¾	1	1¼	1½	1½	2
No. 6, with valve each.....	\$9.00	10.50	13.50	16.50	22.50	27.50	42.00	63.00	150.00
No. 6½, with bal. valve (not illustrated), each.....							\$57.00	90.00	187.50

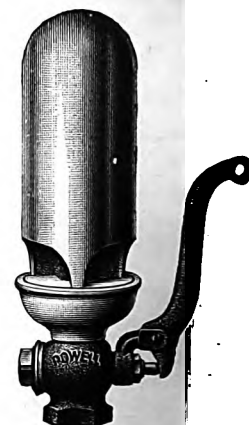


FIG. 2226
NO. 6. ALL BRASS, WITH
ADJUSTABLE VALVE

POP SAFETY VALVES

FOR PORTABLE, FARM AND HOISTING ENGINE BOILERS

A. S. M. E. BRONZE—SEMI-FINISHED

Material and workmanship the best. Prompt and reliable action in service, holding steam to working pressure remarkably close.

In ordering, state pressure at which valve is to blow off.

Size, inch.....	½	¾	1	1¼	1½	2	2½
Approx. Max. H. P.....	6	8	10	20	30	40	75
Top Outlet. Price, each.....	\$8.00	8.00	10.00	12.00	15.00	23.00	38.00
Side Outlet. Price, each.....	\$9.00	9.00	11.00	13.00	17.00	25.00	40.00



TOP OUTLET—FIG. 2227



SIDE OUTLET—FIG. 2228



FIG. 2280

FOOT VALVES WITH STRAINERS

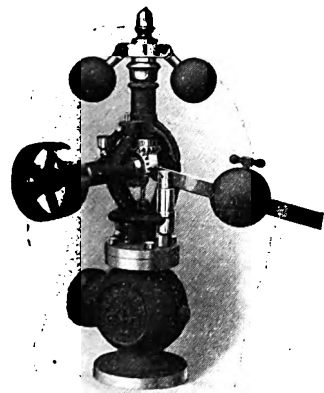
Size, inches.....	¾	1	1¼	1½	2	2½	3	3½	4	4½	5	6
Price, bolted or screwed iron.....	\$1.15	1.30	1.40	1.90	2.40	3.30	3.90	5.60	7.30	10.50	11.25	14.75
Price, bolted or screwed galvanized.....	\$1.75	2.00	2.10	2.85	3.60	5.00	5.75	8.50	11.00	15.75	16.75	22.00

GARDNER GOVERNORS

For convenience in ordering, governors are described in two classes: "A" and "B"—Class A having stop motion, and Class B without stop motion. Workmanship and quality are the same. Standard Type made in Class "A" only.

When any doubt exists in your mind as to the size and style of governor most suitable for your engine, give the following information:

Is engine vertical or horizontal? Diameter of cylinder. Length of stroke. Number of revolutions per minute. Diameter of driving pulley on engine. Length of governor shaft. Diameter and length of steam pipe. Diameter and estimated weight of pulley. Dimensions of rim. State purpose for which engine is used.

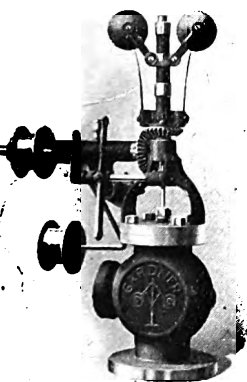


CLASS "A" STANDARD
FIG. 2325

GARDNER STANDARD CLASS "A" GOVERNOR

This is the oldest type of Gardner Governor, and is recommended as the more desirable for the slow and medium speed stationary engines. It is fitted with an automatic safety stop that is simple in construction, and absolutely reliable; will not stick; certain in its action, and never fails to work at the proper time.

The Governor is of the gravity action entirely, and is made in sizes from 1¼ to 16-inch inclusive. It is especially adapted to the larger types of stationary engines. Made for both Horizontal and Vertical engines, but unless advised to the contrary, it is always fitted for Horizontal engines.



CLASS "A" SPRING
FIG. 2326

GARDNER SPRING GOVERNOR

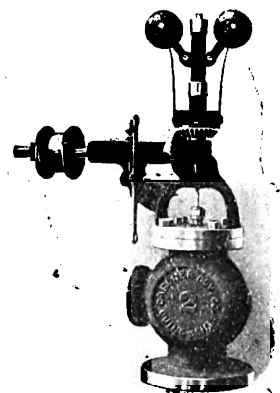
This Governor is recommended for traction and high-speed stationary engines. It is very quick and sensitive in action, and is therefore capable of responding promptly to the various changes in load.

The balls are rigidly connected to steel springs, the lower ends of the springs being secured to a revolving sleeve which receives its rotation through mitre gears; links connect the balls to an upper revolving sleeve, which is free to move perpendicularly. The balls at the free ends of the springs furnish the centripetal force, and the springs are the main centripetal agents. No gravity is employed.

As its name implies, the Governor is of Spring action entirely and works well in any position.

The sizes range from ½ inch to 7 inches, each fitted with a convenient Sawyer's lever and a speeder, through which a wide range of speed can be obtained.

For excellence of design, simplicity, durability and accuracy of regulation, the Gardner Spring Governor is without a peer.



CLASS "B" SPRING
FIG. 2327

GARDNER GOVERNORS

TABLE OF DIMENSIONS OF CLASS "A" STANDARD GOVERNORS

Size of Governor Diameter of Opening	1½	1½	2	2¼	2½	3	3½	4	4½	5	6	7	8	9	10	12
Diameter of Base Flange.....	Sc'd	5½	7	7	8	9	9	10	10	12	14	15	17	18	19	20
Diameter of Side Flange.....	Sc'd	Sc'd	Sc'd	7	7	8	9	10	10	11	13	14	15	16	17	19
Largest Radius of Balls.....	5	5	6	6	6½	7½	7½	8½	8½	10	11	12	12	15	15	15
From Center to Side Flange.....	3¼	3½	4¾	4¾	5½	6½	6½	6¾	7	7¾	8¼	9	10¾	11	13	15
From Base to Center of Inlet.....	3¾	4	4¾	5½	5¾	6½	6½	6¾	7¾	8¼	9¼	10¾	11	15	15	15
Extreme Height.....	22½	22½	27¼	27¾	28½	32	32½	37	38	45½	45¾	51¼	53	55	67	67
From Center to End of Shaft.....	11	11	13	13	15	15	17	17	17	21	21	25½	25½	25½	28	28
Diameter of Pulley.....	3	3	5	5	5	5½	5½	6	6	7	7	10	11	12	12	12
Width of Belt.....	1½	1½	2	2	2	2	2	2½	2½	3	3	3	3	3	3	3
Number of Revolutions.....	250	250	200	200	200	170	170	160	160	150	150	130	130	130	115	115
Diam. Cyl.—300 feet Piston Speed..	6	7	9	10	12	14	16	18	20	22	26	31	36	40	45	54
Diam. Cyl.—400 feet Piston Speed..	5	6	8	9	10	12	14	16	18	20	23	27	31	35	39	47
Diam. Cyl.—500 feet Piston Speed..	4½	5	7	8	9	10	12	14	16	18	21	24	28	31	35	42
Diam. Cyl.—600 feet Piston Speed..	4	4½	6	7	8	9	11	13	15	16	19	22	25	28	32	39

The last four lines in above table give the proper size of Governor for different diameter of cylinders at various piston speeds. For example: A 12-inch engine running at 400 feet piston speed should have a 3-inch Governor. To find piston speed, multiply the number of revolutions per minute by twice the length of stroke in inches and divide by 12.

TABLE OF DIMENSIONS OF CLASSES "A" AND "B" SPRING GOVERNORS

Size of Governor Diameter of Opening	½	¾	1	1¼	1½	2	2¼	2½	3	3½	4	4½	5	6	7
Diameter of Base Flange.....	Sc'd	Sc'd	Sc'd	Sc'd	Sc'd	5½	7	7	8	9	10	10	12	14	15
Diameter of Side Flange.....	Sc'd	Sc'd	Sc'd	Sc'd	Sc'd	Sc'd	7	7	8	9	10	10	11	12	14
Height—Inches.....	12	13	13½	19½	22	23	24	27	29	30	35	36	37	42	44
Radius of Balls.....	2½	2½	2½	3½	4	4	4	5	5	5	6	6	6	7	7
From Center of Governor to End of Shaft.....	8	8½	8½	10¾	10¾	13	13	15	15	16	17	17	21	21	25½
Diameter of Pulley.....	1½	1½	1½	2	2½	2½	2½	3½	3½	3½	4½	4½	4½	6	6
Width of Belt.....	1	1	1	1¼	1½	1½	1½	2	2	2	2½	2½	2½	3	3
Center to Side Flange.....	1¾	2¾	2½	3¼	3½	4¼	4¾	5½	6½	6½	6½	7	7¾	8¼	9
Base to Center of Inlet.....	1¾	2¼	2¾	3¾	4	4¾	5¾	5¾	6½	6½	6½	7½	7¾	8¼	9¼
Number of Revolutions.....	600	600	600	450	400	400	400	350	350	350	275	275	275	280	280

Flanges on Gardner Governors, Valves, and Regulators are made to conform to the United States Standard.

PRICE LIST OF STANDARD CLASS "A" GOVERNORS

Size of Governor. Dia. of Opening ..	1¼	1½	2	2¼	2½	3	3½	4	4½	5	6	7	8	9	10	12
Ship. Wt., lbs.....	60	65	100	116	130	170	180	260	270	438	500	680	790	950	1275	1550
Price each, plain..	\$49.00	\$59.00	\$72.00	\$84.00	\$96.00	\$118.00	\$142.00	\$166.00	\$192.00	\$218.00	\$280.00	\$340.00	\$420.00	\$482.00	\$540.00	\$670.00

PRICE LIST OF CLASSES "A" AND "B" SPRING GOVERNORS

Size of Governor, Diam. of Opening.....	½	¾	1	1¼	1½	2	2¼	2½	3	3½	4	4½	5	6	7
Shipping Weight, lbs.....	...	19	20	36	51	70	80	120	140	150	220	230	300	400	500
Price, Class A, Plain .....	...	\$37.00	\$42.00	\$49.00	\$59.00	\$72.00	\$84.00	\$96.00	\$118.00	\$142.00	\$166.00	\$192.00	\$218.00	\$280.00	\$340.00
Shipping Weight, lbs.....	30	17	18	32	47	63	72	115	130	140	203	232	290	380	475
Price, Class B, Plain	\$28.00	\$32.00	\$36.00	\$42.00	\$50.00	\$60.00	\$70.00	\$80.00	\$100.00	\$120.00	\$142.00	\$166.00	\$188.00	\$244.00	\$300.00

PICKERING GOVERNORS

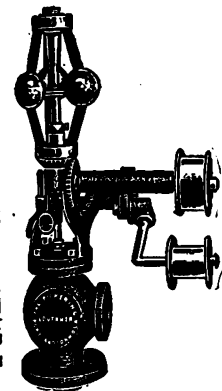
EQUIPPED WITH WIDE RANGE SPEED CHANGER

CLASS "B"

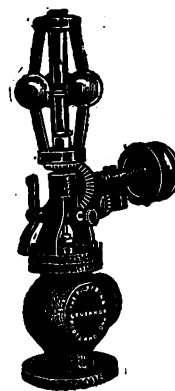
Class B represents Governor with speed changer by use of which the speed of engine can be varied while in motion. Cord attached to Sawyer's Lever permits stopping of engine from a distance. Class B can be changed to Class A by ordering stop motion parts. Plain Governors have balls, cap, and edges of flanges turned but not polished.

CLASS "A"

Class A is the same as Class B, except with the addition of Automatic Safety Stop. The stop closes valve when the belt breaks and is simple and certain in its action. When Governor is to be driven by a vertical belt, order should so specify. Automatic Stops are arranged for both horizontal and vertical engines, but the horizontal arrangement is always sent unless vertical device is specified.



CLASS "A"—FIG. 2330



CLASS "B"—FIG. 2331

TABLE OF DIMENSIONS OF CLASSES "A" AND "B" GOVERNORS

Size of Governor Diameter of Opening	½"	¾"	1"	1¼"	1½"	2"	2¼"	2½"	3"	3½"	4"	4½"	5"	6"	7"	8"	9"	10"
Diameter of Base Flange....	Screwed or 3½"	Screwed or 3½"	Screwed or 4"	Screwed or 4½"	5	6	7	Screwed or 7"	7½"	8½"	9	9½"	10	11	12½"	13½"	15	16
Diameter of Side Flange....	Screwed	Screwed	Screwed	Screwed	Screwed	Screwed	7	7½"	8½"	9	9½"	10	11	12½"	13½"	15	16	
From Center to Side Flange..	1½"	2½"	3	3	3½"	3½"	4¼"	4½"	5	6	6½"	6½"	7½"	8	8½"	9½"	11	11½"
From Base to Center of Inlet..	2	2½"	2½"	3	3½"	4	4¼"	5	5½"	6	7	7½"	8	8½"	9	10	11½"	11½"
From Center to end of Bearing	5	5	6½"	6½"	8	8	9½"	9½"	10½"	10½"	12½"	12½"	12½"	12½"	12½"	15½"	15½"	15½"
Extreme Height.....	15½"	14½"	19	20½"	24	25½"	27½"	27½"	32½"	34	41½"	41½"	46½"	49½"	49½"	54	59	61
Greatest Expansion of Balls..	5	5½"	7	7	8	8	9	9	10	10	13	13	15	16½"	16½"	18	20	20
Speed of Governor Shaft.....	550	600	350	350	380	380	300	300	340	340	320	320	275	275	275	260	260	225
Diameter Pulley on Governor..	2	2	2½"	2½"	3½"	3½"	4	4	4	4	5	5	5	6	7	7	8	8
Width of Belt.....	¾"	¾"	1¼"	1¼"	1½"	1½"	2	2	2	2	2½"	2½"	2½"	3	3	3	3	3
Dia. Cyl. 300 ft. Piston Speed	400	4	5	6	7	9	10	12	14	16	18	20	22	26	31	36	40	45
" " 400 " "	"	3	4	5	6	8	9	10	12	14	16	18	20	23	27	31	35	39
" " 500 " "	"	"	3½"	4½"	5	7	8	9	10	12	14	16	18	21	24	28	31	35
" " 600 " "	"	"	"	4	4½"	6	7	8	9	11	13	15	16	19	22	25	28	32

MITRE GEARS. When desired we can furnish 1" and 1¼" Governors to run at 500, the 1½" and 2" at 475, the 2¼" and 2½" Governors to run at 430 revolutions per minute, by using Mitre Gears in place of Bevel, which are our regular equipment.

EXPLANATION. The dimensions appearing above apply to our regular assembly and if others are desired we will be glad to confer on the subject.

Those Governors indicated as "screwed" connections in table of dimensions will be furnished flanged when desired and to dimensions given as optional in table, which are United States Standard, unless customer specifies differently.

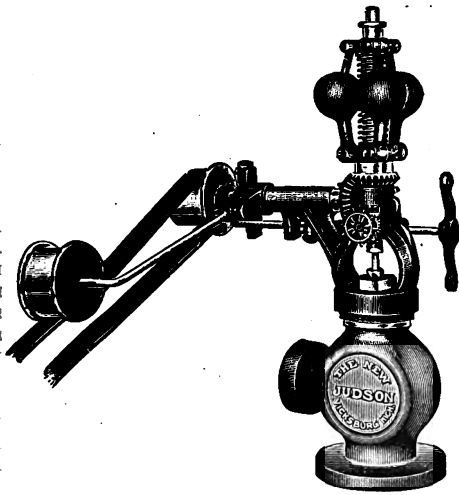
The last four lines in above table show Piston Speeds and Cylinder diameters for which Governors of different sizes are adapted. Satisfactory service will be found within the limits stated, but we will only guarantee when ordered by table.

PRICE LIST OF CLASSES "A" AND "B" GOVERNORS

Size of Governor, Diameter of Opening	½"	¾"	1"	1¼"	1½"	2"	2¼"	2½"	3"	3½"	4"	4½"	5"	6"	7"	8"	9"	10"
Shipping Weight, lbs.....	18	22	38	45	68	73	95	110	155	175	250	280	400	435	510	700	745	860
Price, Class A, Plain.....	\$33.00	37.00	42.00	49.00	59.00	72.00	84.00	96.00	118.00	142.00	166.00	192.00	218.00	280.00	340.00	420.00	482.00	540.00
Shipping Weight, lbs.....	17	20	35	42	65	70	90	105	150	170	245	255	390	425	500	690	730	850
Price, Class B, Plain.....	\$28.00	32.00	36.00	42.00	50.00	60.00	70.00	80.00	100.00	120.00	142.00	166.00	188.00	244.00	300.00	370.00	430.00	480.00

NEW JUDSON THREE-BALL GOVERNOR.

FOR STEAM AND GAS ENGINES



CLASS B
FIG. 2323

The New Judson is a slow speed Governor still its velocity is high enough to regulate closer than any throttling Governor on the market. This Governor is equipped with the new mitre gear speeder, a device patented Feb. 16, 1909, and used solely on the New Judson Governor. The Governor stem and valve stem are entirely separate from one another. The speed may be increased or diminished by a hand wheel connected to the mitre gear, which raises or lowers the valve without changing the tension of either spring or adding the least friction to any of the running parts of the Governor.

The speed adjustment is a feature of the New Judson, as it completely overcomes all lost motion between the ball and the valve and working through mitre gears, it is impossible for the speed to be changed in any way other than manipulating the hand wheel of the speeder.

When the proper speed has been obtained there is no locknut to set up to prevent change of speed as is the case with some of the governors now manufactured, a condition which will be very much appreciated by the trade.

They are all made with swivel connection between globe and frame and secured by a single set screw, which is a convenience in placing the shaft in alignment with the belt, also in taking governor apart. By slacking the set screw the whole top can be taken off, leaving the globe with stuffing box and valve stem together and the entire top together. After removing the top the stuffing box and valve can be readily taken out with a common wrench.

The Class "A" Governor is with the Automatic Stop Attachment and the Class "B" without it. The Automatic Stop Attachment is arranged for both horizontal and vertical engines, and we will ship horizontal arrangement, unless vertical is specified.

In ordering Governors, give speed of engine and diameter of engine pulley.

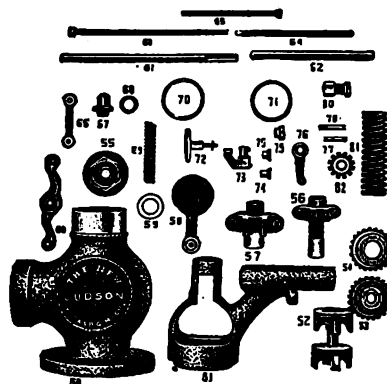
DIMENSIONS AND PRICES

Size, inches	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{3}{4}$	1	$1\frac{1}{4}$	$1\frac{1}{2}$	2	$2\frac{1}{2}$	3	$3\frac{1}{2}$	4
Diameter base flange.....	Screw	Screw	Screw	Screw	5	6	$6\frac{1}{2}$	$7\frac{1}{2}$	8	10	12
Diameter side flange.....	Screw	Screw	Screw	Screw	$4\frac{1}{2}$	5	6	7	$7\frac{1}{2}$	9	10
From center to side flange.....		$1\frac{1}{2}$	$1\frac{3}{4}$	$2\frac{3}{8}$	$2\frac{7}{8}$	$3\frac{1}{2}$	$4\frac{1}{2}$	$5\frac{1}{8}$	6	$6\frac{1}{2}$	$7\frac{1}{4}$
From base to center of inlet.....		$1\frac{3}{4}$	$1\frac{3}{4}$	$2\frac{1}{2}$	$3\frac{3}{8}$	$3\frac{1}{4}$	$4\frac{1}{2}$	$4\frac{7}{8}$	$6\frac{1}{4}$	7	$8\frac{1}{4}$
From center to end of shaft.....		$7\frac{3}{4}$	$7\frac{3}{4}$	$8\frac{3}{8}$	9	9	$13\frac{1}{4}$	$13\frac{1}{4}$	$13\frac{3}{4}$	16	16
Extreme height.....		14	$14\frac{1}{2}$	$16\frac{1}{4}$	$20\frac{3}{4}$	21	$25\frac{3}{4}$	27	30	36	40
Speed of governor.....	700	500	500	400	350	350	300	300	300	275	275
Diameter pulley.....	$1\frac{1}{2}$	$2\frac{1}{4}$	$2\frac{1}{4}$	$2\frac{1}{4}$	3	3	$3\frac{1}{4}$	$3\frac{1}{4}$	$3\frac{1}{4}$	$3\frac{1}{2}$	$3\frac{1}{2}$
Width belt.....	1	$1\frac{1}{4}$	$1\frac{1}{4}$	$1\frac{1}{4}$	$1\frac{1}{2}$	$1\frac{1}{2}$	2	2	2	$2\frac{1}{2}$	$2\frac{1}{2}$
Largest radius balls.....		$2\frac{1}{2}$	$2\frac{1}{2}$	3	$3\frac{1}{2}$	$3\frac{1}{2}$	$4\frac{1}{4}$	$4\frac{1}{4}$	$4\frac{1}{2}$	5	5
Diam. cyl.—300 ft. piston speed.....		3	4	5	6	7	9	12	14	16	18
" " 400 " " " ".....		$2\frac{1}{2}$	3	4	5	6	8	10	12	14	16
" " 500 " " " ".....				$3\frac{1}{2}$	$4\frac{1}{2}$	5	7	9	10	12	14
" " 600 " " " ".....					4	$4\frac{1}{2}$	6	8	9	11	13
Class A, Price each.....		\$33.00	37.00	42.00	49.00	59.00	72.00	96.00	118.00	142.00	166.00
Class B, Price each.....		\$28.00	32.00	36.00	42.00	50.00	60.00	80.00	100.00	120.00	142.00

REPAIR PARTS OF NEW JUDSON THREE-BALL GOVERNORS

NUMBER AND NAME OF PARTS

- 30 Valve Chamber
- 31 Frame
- 32 Valve
- 33 Shift Gear
- 34 Sleeve Gear
- 35 Valve Chamber Cap
- 36 Top Sleeve
- 37 Bottom Sleeve
- 38 Balls
- 39 Tension Nut
- 40 Sawyer Lever
- 41 Shaft
- 42 Hollow Standard
- 43 Governor Stem
- 44 Speeder Shaft
- 45 Valve Rod
- 46 Arms



- 67 Plain Top
- 68 Standard Collar
- 69 Lifter Spring
- 70 Top Bushing
- 71 Bottom Bushing
- 72 Speeder Thumb Wheel & Shaft
- 73 Speeder Bracket
- 74 Speeder Top Gear
- 75 Speeder Bottom Gear
- 76 Lifter
- 77 Top Sleeve Screw
- 78 Bottom Sleeve Screw
- 79 Valve Nut
- 80 Stuffing Box Complete
- 81 Main Spring
- 82 Sprocket

FIG. 2324

As each part is made to gauge and a complete record of all governors is kept by the manufacturers please make sure that all orders for parts are accompanied with the manufacturer's serial number of the governor for which the parts are required.

NEW JUDSON THREE-BALL GOVERNOR—REPAIR PARTS

PRICE LIST

No.	Size, inch	$\frac{3}{8}$, $\frac{1}{2}$	$\frac{3}{4}$	1	$1\frac{1}{4}$	$1\frac{1}{2}$	2	$2\frac{1}{2}$	3
50	Each.....	\$5.50	\$6.00	\$8.00	\$11.00	\$12.00	\$16.00	\$20.00	\$28.00
51	Each.....	7.50	8.00	9.00	10.00	10.00	12.00	15.00	18.00
52	Each.....	3.50	3.50	4.00	5.50	6.00	7.00	9.00	11.00
53	Each.....	1.20	1.50	1.80	2.00	2.00	2.50	2.50	2.50
54	Each.....	1.20	1.50	1.80	2.00	2.00	2.50	2.50	2.50
55	Each.....	2.50	3.00	3.50	4.00	4.50	5.00	5.00	5.00
56	Each.....	2.00	2.50	3.00	4.00	4.00	5.00	5.00	5.00
57	Each.....	2.00	2.50	3.00	4.00	4.00	5.00	5.00	5.00
58	Per Set.....	3.50	4.00	5.00	6.00	7.00	7.50	7.50	10.00
59	Each.....	1.20	1.20	1.20	1.60	1.60	2.00	2.00	2.00
60	Each.....	.80	.90	.90	1.00	1.00	1.00	1.00	1.00
61	Each.....	1.60	2.00	2.00	2.00	2.50	3.00	3.00	3.00
62	Each.....	2.50	2.50	2.50	3.00	3.00	3.20	3.20	3.20
63	Each.....	2.00	2.50	2.50	3.00	3.00	3.00	3.00	3.00
64	Each.....	.60	.80	.80	1.00	1.00	1.20	1.20	1.20
65	Each.....	3.00	3.80	3.80	4.00	4.00	4.50	4.50	4.50
66	Per Set.....	2.50	2.50	2.50	3.00	3.00	4.00	4.00	4.00
67	Each.....	1.80	1.80	1.80	2.00	2.00	2.50	2.50	2.50
68	Each.....	1.00	1.20	1.20	1.20	1.20	1.50	1.50	1.50
69	Each.....	1.60	1.80	1.80	2.00	2.00	2.50	2.50	2.50
70	Each.....	.80	.80	1.00	1.20	1.50	2.00	2.50	2.50
71	Each.....	.80	.80	1.00	1.20	1.50	2.00	2.50	2.50
72	Each.....	1.20	1.20	1.20	1.50	1.50	1.50	1.50	1.50
73	Each.....	2.00	2.00	2.40	2.40	2.80	3.00	3.00	3.50
74	Each.....	.50	.50	.50	.80	.80	.80	.80	.80
75	Each.....	.50	.50	.50	.80	.80	.80	.80	.80
76	Each.....	.40	.50	.50	.70	.70	.80	.80	.80
77	Each.....	.40	.40	.40	.50	.50	.50	.50	.50
78	Each.....	.50	.50	.50	.60	.60	.60	.60	.60
79	Each.....	1.00	1.00	1.20	1.50	1.50	1.80	1.80	2.00
80	Each.....	2.50	2.50	2.50	3.00	3.60	4.00	4.00	4.00
81	Each.....	2.50	2.50	3.00	3.50	3.50	4.00	4.00	5.00
82	Each.....	1.00	1.20	1.00	1.10	1.10	1.20	1.20	1.20

GARDNER GOVERNOR—REPAIR PARTS

NUMBER AND NAME OF PARTS

CLASS "A" STANDARD

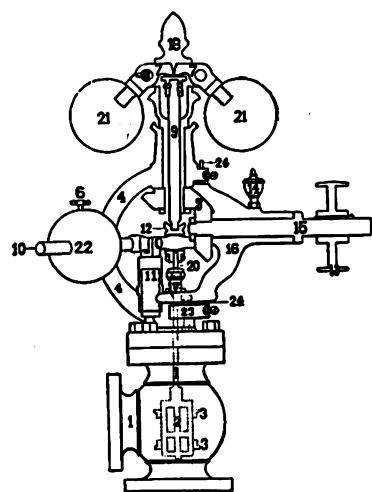


FIG. 2328
STANDARD

- 1 Valve Chamber
- 2 Valve
- 3 Valve Seats (2)
- 4 Frame
- 5 Gears Mitre (2)
- 6 Lever Ball Screw
- 7 Arms (2)
- 8 Tee Plate
- 9 Spindle
- 10 Lever
- 11 Fulcrum and Stud
- 12 Step Bearing
- 13 Pulley
- 14 Oil Cup
- 15 Pulley Shaft
- 16 Shaft Bearing
- 17 Stuffing Box
- 18 Head
- 19 Arm Pin (2)
- 20 Valve Stem
- 21 Arm Balls (2)
- 22 Lever Ball
- 23 Check Stud
- 24 Sleeve Connections (2)

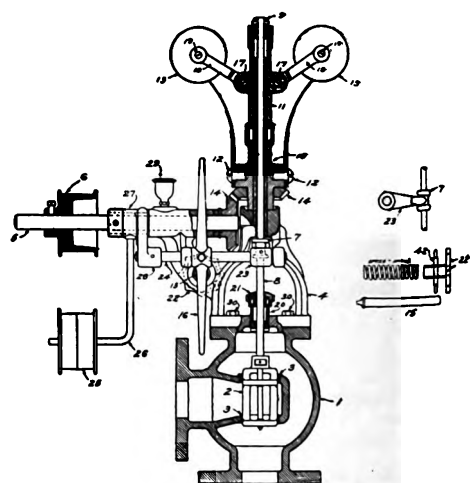


FIG. 2329
SPRING

CLASS "A" AND CLASS "B" SPRING

- | | | | |
|----------------------|---------------------------|--------------------------|----------------------------|
| 1 Chamber | 9 Collar | 17 Yoke Pins (2) Short | 25 Stop Motion Idle Pulley |
| 2 Valve | 10 Revolving Head | 18 Yokes (2) | 26 Stop Motion Drop Arm |
| 3 Valve Seats (2) | 11 Sliding Sleeve | 19 Yoke Pins (2) Long | 27 Stop Motion Sleeve |
| 4 Frame and Standard | 12 Spring Cap Screw | 20 Stuffing Box (Bottom) | 28 Stop Motion Lever |
| 5 Pulley Shaft | 13 Balls & Springs | 21 Stuffing Box (Cap) | 29 Oil Cup |
| 6 Pulley | 14 Gears | 22 Speed Screw | 30 Cap Screws (4) |
| 7 Spool | 15 Speeder Spring & Guide | 23 Short Lever | |
| 8 Valve Stem | 16 Hand Lever | 24 Lever Shaft | |

GARDNER GOVERNOR—REPAIR PARTS**PRICE LIST OF REPAIR PARTS FOR CLASS "A" STANDARD**

No.	Size Inches	1¼	1½	2	2¼	2½	3	3½	4	4½	5	6
1	Each	\$10.00	\$12.00	\$16.00	\$20.00	\$24.00	\$30.00	\$40.00	\$50.00	\$60.00	\$70.00	\$100.00
2	Each	2.40	2.70	2.90	3.10	3.30	3.90	4.90	5.50	6.60	8.80	11.00
3	Per Set	2.40	2.70	2.90	3.10	3.30	3.90	4.90	5.50	6.60	8.80	11.00
4	Each	8.00	8.00	10.00	11.00	15.00	20.00	24.00	29.00	34.00	39.00	39.00
5	Per Set	3.30	3.30	3.90	3.90	3.90	4.40	4.40	6.20	6.20	8.80	8.80
6	Each	.80	.80	1.10	1.10	1.10	1.30	1.30	1.90	1.90	2.20	2.20
7	Per Set	4.40	4.40	5.50	5.50	5.50	7.20	7.20	9.40	9.40	13.20	13.20
8	Each	.70	.70	.90	.90	.90	1.30	1.30	1.80	1.80	2.20	2.20
9	Each	1.90	1.90	2.20	2.20	2.20	3.30	3.30	4.40	4.40	6.60	6.60
10	Each	4.40	4.40	5.50	5.50	5.50	6.60	6.60	8.80	8.80	13.20	13.20
11	Each	5.50	5.50	6.60	6.60	6.60	8.80	8.80	11.00	11.00	15.40	15.40
12	Each	2.80	2.80	3.30	3.30	3.30	4.40	4.40	5.50	5.50	6.60	6.60

No.	Size Inches	1¼&1½	2,2¼&2½	3&3½	4&4½	5&6
13	Each	\$2.20	\$3.90	\$4.40	\$5.00	\$5.50
14	Each	.60	.90	.90	1.10	1.10
15	Each	3.30	4.40	5.50	7.70	11.00
16	Each	3.90	5.00	7.20	8.80	13.20
17	Each	3.30	3.30	4.40	4.40	6.60
18	Each	10.00	15.00	19.00	24.00	29.00
19	Per Set	.70	.80	1.10	1.30	1.90
20	Each	.70	1.00	1.30	1.70	2.20
21	Per Set	3.30	5.50	7.70	11.00	15.40
22	Each	2.80	3.30	4.40	6.60	11.00
23	Each	2.20	2.80	3.30	3.90	4.40
24	Per Set	.90	1.10	1.30	1.90	2.00

PRICE LIST OF PARTS FOR SPRING GOVERNORS

No.	Size Inch	1¼	1½	2	2¼	2½	3	3½	4	4½	5	6
1	Each	\$10.00	\$12.00	\$16.00	\$20.00	\$24.00	\$30.00	\$40.00	\$50.00	\$60.00	\$70.00	\$100.00
2	Each	2.40	2.60	2.90	3.10	3.30	3.90	4.80	5.50	6.60	8.80	11.00
3	Per Set	2.40	2.60	2.90	3.10	3.30	3.90	4.80	5.50	6.60	8.80	11.00
4	Per Set	7.50	9.00	11.00	12.00	14.50	19.00	22.00	27.00	31.50	37.00	40.00
5	Each	3.90	3.90	4.40	4.40	4.40	6.60	6.60	7.70	7.70	8.80	8.80
6	Each	2.70	3.30	3.30	3.30	4.40	4.40	4.40	6.60	6.60	6.60	8.80
7	Each	.70	.80	.80	.80	1.10	1.10	1.10	1.70	1.70	1.70	2.80
8	Each	1.00	1.10	1.40	1.60	1.80	2.00	2.20	2.40	2.80	3.30	3.90
9	Each	.90	1.10	1.10	1.10	1.30	1.30	1.30	1.70	1.70	1.70	2.80
10	Each	3.50	4.40	4.00	4.00	5.50	5.50	5.50	8.30	8.30	9.90	9.90
11	Each	3.50	4.40	4.00	4.00	5.50	5.50	5.50	8.30	8.30	9.90	9.90
12	Each	.30	.50	.50	.50	.50	.50	.50	.60	.60	.60	.60
13	Per Pair	4.40	5.50	5.50	5.50	7.70	7.70	7.70	11.00	11.00	15.40	15.40
14	Per Set	3.50	3.50	3.50	3.50	4.40	4.40	4.40	7.70	7.70	9.90	9.90
15	Per Set	.80	.90	.90	.90	1.10	1.10	1.10	1.90	1.90	2.80	2.80

No.	Size Inch	1¼	1½,2&2¼	2½,3&3½	4&4½	5&6
16	Each	\$1.60	\$1.90	\$2.80	\$3.30	\$3.90
17	Per Set	.70	.90	1.10	1.30	1.70
18	Per Set	2.70	3.00	3.50	4.40	6.60
19	Per Set	.90	1.10	1.30	1.60	1.90
20	Each	1.70	1.70	2.20	3.30	4.40
21	Each	1.30	1.30	1.70	2.20	3.30
22	Each	.80	.90	1.10	1.70	2.20
23	Each	.90	1.10	1.30	1.90	2.20
24	Each	.80	1.10	1.30	1.90	2.20
25	Each	2.80	3.90	4.40	6.60	7.70
26	Each	1.90	2.20	3.30	4.40	5.50
27	Each	3.30	4.40	5.50	7.70	8.80
28	Each	2.00	2.40	3.30	4.40	5.50
29	Each	.60	.60	.90	1.10	1.30
30	Per Set	.70	.90	1.10	1.60	1.80

In ordering, be particular to give number or date of Governor, which is stamped on the head, otherwise order cannot be executed.

PENBERTHY AUTOMATIC INJECTORS

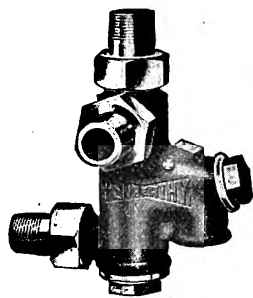


FIG. 2336

A high grade automatic machine; meaning, if the current of water is broken by any cause, the injector will pick up the water and re-establish the current to the boiler without the least attention. Every machine is carefully tested, and will work on the following points: Start low, 20 to 22 lbs. steam on 3-foot lift. Work high, 165 to 170 lbs. steam on 3-foot lift. Lift water, 20 to 24 feet on 60 to 80 lbs. steam. Will deliver water to boiler at 160 to 212 degrees, according to temperature of feed water and steam pressure. Water 200 to 212 degrees can always be delivered at nearly all pressures over 50 lbs. by throttling suction valve and delivering minimum capacity. It is advisable in many cases to install an injector large enough so that the supply can be cut down and attain this result, thereby saving fuel. By placing a short piece of pipe having a stopcock, in the overflow, and closing after the injector has started, water 8 to 10 degrees hotter can be handled, but the injector is rendered non-automatic while the stopcock is closed.

Size	H. P. Based on Ordinary Tubular Boiler	H. P. Based on 30 lbs. Water per H. P. per Hour	Pipe Connections Inches	Gallons per Hour 1 to 3-ft. Lift, 60 to 110 Lbs. Steam Pressure		Price Each
				Max.	Min.	
O	3 to 6	4 to 8	1/4	60	35	\$ 15.00
OO	4 " 8	6 " 12	3/8	80	45	16.00
A	8 " 16	10 " 20	1/2	135	70	18.00
AA	12 " 22	15 " 30	1/2	180	100	20.00
B	17 " 32	22 " 45	3/4	260	140	25.00
BB	20 " 45	25 " 60	3/4	360	180	30.00
C	40 " 65	45 " 80	1	475	250	40.00
CC	45 " 80	50 " 100	1	600	325	45.00
D	50 " 100	60 " 135	1 1/4	800	425	55.00
DD	75 " 135	85 " 165	1 1/4	1000	525	60.00
E	100 " 180	125 " 235	1 1/2	1400	740	75.00
EE	115 " 255	150 " 320	1 1/2	1900	850	90.00
F	160 " 320	200 " 400	2	2400	1275	110.00
FF	200 " 400	250 " 500	2	3000	1600	125.00
G	300 " 500	325 " 600	2 1/2	3600	1875	150.00
GG	375 " 600	400 " 750	2 1/2	4200	2150	200.00

FOR REPAIR PARTS SEE PAGE 681

PENBERTHY "AUTO-POSITIVE" INJECTORS

To meet the demand for an injector operating between 150 and 200 lbs. pressure, handling water that has become heated by the use of a siphon, and consequently too hot for injectors of the usual automatic type. It is constructed on new principles, having but five working parts, and combining the features of a positive and automatic injector.

Will start on a short lift at 20 to 25 lbs. pressure and operate to 200 lbs. pressure, water 74° Fahr. At winter temperature, works to 240 lbs. pressure. Will lift 3 feet at 200 lbs. pressure to 20 to 23 feet at 65 to 120 lbs. Will handle hot water at 130° to 135° at 75 to 100 lbs., 125° to 130° at 50 to 120 lbs., 110° to 115° at 35 to 150 lbs., 90° to 95° at 28 to 175 lbs., under 60° at 30 to 225 lbs., and under 40° at 35 to 240 lbs.

By placing a cock in overflow, water 6° to 8° hotter can be handled. This renders the injector non-automatic while stopcock is closed.



FIG. 2337

No.	H. P. Allowing 7½ to 8 Gals. per H. P. per Hour	Pipe Con- nections Inches			Cap. per Hr., 75 to 125 lbs. Steam 3-ft. Lift, Gals.		Price Each	No.	H. P. Allowing 7½ to 8 gals per H. P. per Hour	Pipe Con- nections Inches			Cap. per Hr., 75 to 125 lbs. Steam 3-ft. Lift, Gals.		Price Each
		Steam	Suction	Deliv- ery	Max.	Min.				Steam	Suction	Deliv- ery	Max.	Min.	
112	5 to 15	¾	¾	¾	120	40	\$18.00	119	47 to 145	1¼	1¼	1¼	1125	375	\$ 60.00
113	7 " 25	½	½	½	200	60	20.00	121	87 " 265	1½	1½	1½	2000	700	90.00
115	16 " 50	¾	¾	¾	400	130	30.00	123	125 " 400	2	2	2	3000	1000	125.00
117	28 " 85	1	1	1	675	225	45.00	125	200 " 600	2½	2½	2½	4200	1500	200.00

FOR REPAIR PARTS SEE PAGE 682

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PENBERTHY "XL-96" IMPROVED EJECTORS

LIFTS 22 TO 25 FEET. ELEVATES 25 TO 100 FEET, 30 TO 100 POUNDS PRESSURE

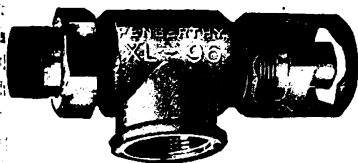


FIG. 2338

The lifting and elevating power is so combined in the "XL-96" Ejector as to make it unquestionably the best device of its kind. The principle and power contained in so small, handy and economical an instrument, continually suggests new uses, which often demand that the tubes of the ejector be proportioned particularly for the service. We can furnish special ejectors singularly efficient in the work for which they are designed.

No.	Steam Con- nection Inches	Suction and Dis- charge Inches	Capacity, Gallons per Hour				Vertical Lift Feet		Price, Each	
			3-Foot Lift		50-Foot Elevation	25-Foot Elevation				
			Steam Pressure, Pounds						Brass	Iron Body Brass Jets
			40 to 65	20 to 40 or 65 to 100	40 to 65	40 to 65	40 to 75	25 to 40 or 75 to 100		
1	3/8	1/2	240	235	120	180	23	20	\$ 8.00	.....
2	1/2	3/4	500	450	250	375	25	22	10.00	.....
3	3/4	1	840	700	420	625	25	22	15.00	.....
4	1	1 1/4	1350	1300	650	950	25	22	20.00	.....
5	1	1 1/2	1950	1850	975	1450	25	22	25.00	\$20.00
6	1 1/4	2	3500	3000	1750	2600	25	22	35.00	27.50
*7	1 1/2	2 1/2	5700	4350	2500	3750	25	22	50.00	40.00
*8	2	3	9500	8160	4750	7200	25	22	70.00	50.00
*9	2	3 1/2	13600	12400	6800	10200	25	22	105.00	70.00
*10	2 1/2	4	18400	17100	9200	13800	25	22	145.00	95.00

FOR REPAIR PARTS SEE PAGE 682

Sizes 5 and 6 will be sent in all brass, unless ordered with iron body and brass jets and steam connection.

*Unless ordered in brass, Sizes 7 to 10, inclusive, will be shipped with iron body, brass jets and steam connection.

TABLE SHOWING SIZE OF BOILERS REQUIRED FOR EJECTORS

Number of Ejector.....	1, 2, 3	4, 5, 6	7, 8	9, 10
Size of Boiler.....horse power	2 to 6	8 to 12	15 to 20	25 to 30

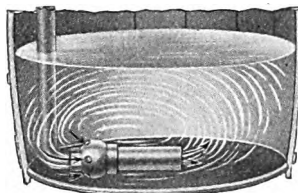
SPECIAL ACID-RESISTING EJECTORS

While the composition used in the regular stock "XL-96" Ejector is very efficient against the milder solutions containing acids, this ejector is made of special anti-acid compositions, which will resist the action of acids as far as it is possible for metal to resist it. Prices on application.

NOISELESS STEAM WATER HEATERS



HEATER ONLY
FIG. 2339



IN OPERATION
FIG. 2340

The use of this heater does away with all noise such as otherwise occurs when heating a tank or barrel of water or other liquid with steam. It is of special value to creameries, chemical works, breweries, etc.

It has no couplings and loose parts to get out of order. Simply put a piece of pipe, 10 to 12 inches long, into large end of heater, and screw heater on to end of steam pipe and place below surface of the liquid.

Size.....number	F	G	H	J	K	L	M	N
Steam Pipe.....inches	1/4	3/8	1/2	3/4	1	1 1/4	1 1/2	2
Discharge Pipe....."	3/8	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2
Capacity*.....gallons	50	60	75	100	125	175	250	500
Price.....each	\$1.50	1.75	2.00	2.50	3.00	4.00	5.00	8.00

*Gallons of water heated 70 to 210 degrees in 30 minutes with 70 pounds steam pressure.

REPAIR PARTS FOR PENBERTHY

AUTOMATIC INJECTORS—AUTO-POSITIVE INJECTORS AND XL-96 EJECTORS

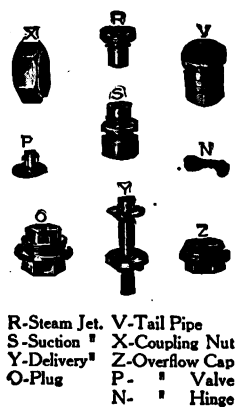


FIG. 2341

REPAIR PARTS FOR AUTOMATIC INJECTORS

Size Injector.....	O OO	A AA	B BB	C CC	D DD	E	EE	F	FF	G GG
R—Steam Jet, each.....	\$.50	\$.70	\$.90	\$1.10	\$1.30	\$1.50	\$1.50	\$ 1.70	\$ 2.00	\$ 4.00
S—Suction Jet, each.....	.50	.70	.90	1.10	1.30	1.50	1.50	1.70	2.00	6.00
Y—Delivery Jet, each.....	2.50	3.00	4.00	5.00	6.00	7.50	9.00	11.00	13.00	18.00
X—Coupling Nut, each.....	.50	.60	.80	1.00	1.20	2.50	2.50	3.00	3.00	4.00
V—Tail Pipe, each.....	.50	.60	.80	1.00	1.20	1.60	1.60	2.00	2.00	2.50
Z—Overflow Cap, each.....	.60	.80	1.00	1.20	1.40	1.60	1.60	1.80	1.80	3.00
P—Overflow Valve, each.....	.80	1.00	1.20	1.50	1.80	2.00	2.20	2.50	2.50	3.50
N—Overflow Hinge, each.....	.20	.20	.30	.30	.30	.40	.40	.40	.40	.80
O—Plug, each.....	1.20	1.60	2.00	2.50	3.00	3.50	3.50	4.00	4.00	8.00
Strainer, each.....	.80	.90	1.00	1.10	1.20	1.50	1.50	2.00	2.00	3.00

In ordering parts do not fail to give serial letter and number, which will be found on top of overflow valve. In referring to or ordering parts, designate them by letter or name as per above.

REPAIR PARTS FOR AUTO-POSITIVE INJECTORS

Size Injector.....	112	113	115	117	119	121	123	125
8—Steam Plug, each.....	\$1.40	\$1.60	\$1.60	\$1.80	\$2.20	\$2.80	\$3.40	\$ 5.00
X—Steam Jet, each.....	.80	1.00	1.20	1.50	1.80	2.00	2.40	4.00
G—Suction Jet, each.....	.60	.80	1.00	1.20	1.50	1.70	2.00	3.00
H—Delivery Jet, each.....	1.80	2.00	3.00	4.00	6.00	8.00	11.00	16.00
4—Delivery Plug, each.....	1.20	1.40	1.60	1.80	2.20	2.80	3.40	5.00
N—Overflow Plug, each.....	1.50	1.60	2.00	2.50	3.00	3.50	4.00	6.00
L—Pressure Valve, each.....	.50	.60	.90	1.20	1.50	2.00	2.50	4.00
M—Press. Valve Collar, each.....	.60	.80	1.20	1.80	2.50	3.50	4.50	6.00
K—Vacuum Valve, each.....	.50	.60	.90	1.20	1.50	2.00	2.50	3.50
I—Coupling Nut, each.....	.50	.60	.80	1.00	1.20	2.50	3.00	4.00
J—Tail Pipe, each.....	.50	.60	.80	1.00	1.20	1.60	2.00	2.50
Strainer, each.....	.80	.90	1.00	1.10	1.20	1.50	2.00	3.00
Tool for Removing Jet, each.....	.90	1.00	1.20	1.40	1.60	1.80	2.00	3.00

In ordering parts give size number; also, if possible, shop number of injector.

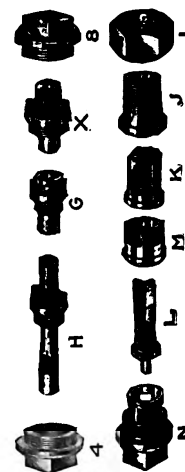


FIG. 2342

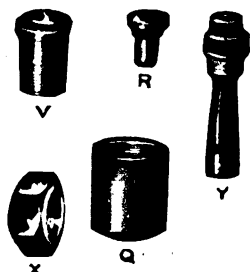


FIG. 2343

REPAIR PARTS FOR XL-96 EJECTORS

Size Number.....	1	2	3	4	5	6	7	8	9	10
R—Jet, each.....	\$.50	\$.70	\$.90	\$1.10	\$1.20	\$1.60	\$2.00	\$ 2.50	\$ 3.00	\$ 4.00
Y—Delivery Jet, each.....	1.60	2.00	2.50	3.00	3.50	5.00	8.00	12.00	16.00	20.00
V—Tail Pipe Brass, each.....	.50	.60	.80	1.00	1.00	1.20	1.60	2.00	2.00	2.50
X—Coupling Nut Brass, each..	.50	.60	.80	1.00	1.00	1.20	2.50	3.00	3.00	4.00
Strainer, each.....	.90	1.00	1.10	1.20	1.50	2.00	3.00	.....	.....	.....
Q—Reg. I. P. Coupling, each..	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....

BRASS GAS SERVICE AND STEAM COCKS



FIG. 2281



FIG. 2282

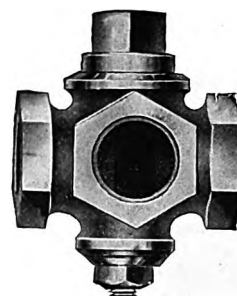


FIG. 2283

GAS SERVICE COCKS

For working Water Pressures up to 125 pounds.

FLAT HEAD

Size.....inches	1/4	3/8	1/2	3/4	1	1 1/4	1 1/2	2
Price.....each	\$1.00	1.00	1.10	1.30	2.10	3.25	4.60	8.00

SQUARE HEAD, FLAT HEAD, MALE AND FEMALE

Size.....inches	1/4	3/8	1/2	3/4	1	1 1/4	1 1/2	2
Price.....each	\$1.00	1.00	1.10	1.30	2.10	3.25	4.60	8.00

STEAM COCKS

SQUARE AND FLAT HEAD

For working Pressures: Steam 125 pounds; Water 175 pounds.

Size.....inches	1/4	3/8	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3
Price.....each	\$0.85	1.00	1.25	1.70	2.35	3.70	4.85	7.30	14.50	22.50

FLANGED—SQUARE OR FLAT HEAD

Size.....inches	3/4	1	1 1/4	1 1/2	2	2 1/2	3	3 1/2	4	5	6
Diam. of Flanges.....inches	3 1/2	4	4 1/2	5	6	7	7 1/2	8 1/2	9	10	11
Price.....each	\$5.50	7.30	9.70	11.75	18.00	27.50	43.00	62.00	84.00	150.00	275.00

These cocks are made to order only.

THREE-WAY SQUARE HEAD

Size.....inches	1/4	3/8	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3
Price.....each	\$2.10	2.10	2.50	3.00	3.75	5.75	7.15	11.00	18.75	26.00

MALLEABLE IRON WRENCHES

SQUARE HEAD

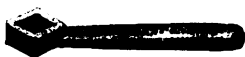


FIG. 2284

FLAT HEAD



FIG. 2285

SQUARE HEAD

Number.....	1	2	3	4	5	6	7	8	9	9	10	10
Size.....inches	1/4	3/8	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3	3 1/2	4
Price.....each	\$.05	.06	.07	.09	.14	.19	.25	.44	.56	.56	1.00	1.00

FLAT HEAD

Number.....	1	2	3	5	6	7	8
Size.....inches	1/2	3/4	1	1 1/4	1 1/2	2	.....
Price.....each	\$.07	.09	.14	.25	.44	.56	1.00

STANDARD BRASS CHECK VALVES

FOR WORKING PRESSURE NOT TO EXCEED 150 POUNDS



HORIZONTAL
FIG. 2286



ANGLE
FIG. 2287



VERTICAL
FIG. 2288



SWING
FIG. 2289

SCREWED

Size, inches.....	1/8	1/4	3/8	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3
Horizontal.....each	\$.65	\$.65	\$.70	\$.90	\$1.15	\$1.60	\$2.25	\$3.15	\$4.75	\$ 9.00	\$13.00
Angle....."	.72	.72	.77	1.00	1.26	1.80	2.52	3.50	5.30	10.00	14.40
Vertical....."	.72	.72	.77	1.00	1.26	1.80	2.52	3.50	5.30	10.00	14.40
Swing....."	.....	.....	1.80	2.00	2.25	2.80	3.65	4.75	6.75	15.00	24.00

PENBERTHY REGRINDING BRASS CHECK VALVES

MEDIUM PATTERN

FOR 200 POUNDS WORKING PRESSURE



HORIZONTAL
FIG. 2290



ANGLE
FIG. 2291



VERTICAL
FIG. 2292



SWING
FIG. 2293

Penberthy Vertical Check Valves have external threads on the lower body, which prevent corrosion and allow the maximum space inside, thus reducing friction. Regrinding can be done easily and quickly with no extra cost. Hexagon caps are furnished on all sizes up to 3-inch, inclusive, above which, round slotted caps are furnished, though either style can be had at the same price. American standard pipe threads will be furnished, but English threads can be had if so specified.

Penberthy Regrinding Swing Check Valves incorporate all the latest improvements in a high grade regrinding valve combined with a theoretically correct valve pattern, in which all pockets have been eliminated, thus producing the least friction and the minimum resistance to the fluid when passing through the valve diaphragm. The swing hinge and valve disc are placed at such an angle and position as to make the valve very sensitive and quick closing. The swing hinge has a stop which allows the valve to open only to its horizontal position, which gives the valve an opening sufficiently large to allow the fluid to go through without any friction, and at the same time makes the valve work more sensitively as soon as the pressure is released.

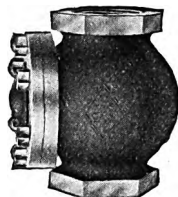
Size.....Inches	1/8	1/4	3/8	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3	3 1/2	4
Price, Horizontal, Angle or Vertical, Rough.....each	\$.50	\$.50	\$.60	\$.85	\$1.15	\$1.55	\$2.30	\$3.25	\$5.20	\$10.00	\$14.00	\$19.75	\$30.75
Price, ditto, Finished....each	.75	.75	.90	1.30	1.75	2.40	3.50	5.00	7.80	12.50	17.50	25.00	37.00
Price, Swing, Finished....each	....	1.25	1.25	1.30	1.75	2.25	3.25	4.25	6.25	11.50	16.00	.....	.....

STANDARD IRON BODY CHECK VALVES

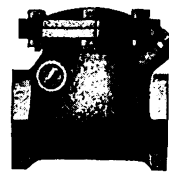
FOR 125 POUNDS WORKING PRESSURE



HORIZONTAL—FIG. 2294



VERTICAL—FIG. 2295



SWING—FIG. 2296

SCREWED

Size	inches	2	2½	3	3½	4	4½	5	6	7	8	10	12
Price, Horizontal, Angle or Vertical.....each		\$3.60	6.50	8.90	12.25	14.25	19.00	22.00	30.00	.....	.....	.....	.....
“ Swing..... “		.....\$12.00	13.50	17.50	20.00	26.00	30.00	36.00	55.00	70.00	110.00	160.00	

FLANGED**HORIZONTAL****VERTICAL**

Size	inches	3	4	5	6	7	8	10	12	14	15	6	7	8	10
Diam. of Flanges, ins.		7½	9	10	11	12½	13½	16	19	21	22¼	11	12½	13½	16
Price.....each		\$11.50	18.00	26.00	35.00	50.00	62.00	115.00	175.00	300.00	.....	45.00	67.00	78.00	135.00

SWING

Size	inches	2½	3	3½	4	4½	5	6	7	8	10	12	14	15
Diameter of Flanges	inches	7	7½	8½	9	9¼	10	11	12½	13½	16	19	21	22¼
Price, Flanged.....each		\$14.50	17.00	21.00	24.00	30.00	34.00	41.00	60.00	75.00	115.00	168.00	340.00	400.00
" Hub End....."		\$19.00	.....	.....	27.00	.....	38.00	45.00	.....	82.50	125.00	185.00	340.00	.....

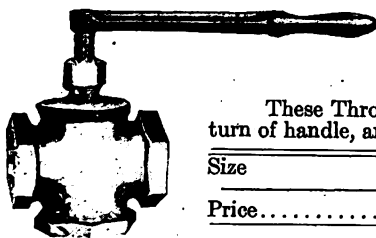


FIG. 2300

THROTTLE VALVES

FOR STEAM WORKING PRESSURES UP TO 125 POUNDS

These Throttle Valves are extensively used on hoisting and traction engines, are opened by one-quarter turn of handle, and are provided with stops. In ordering, always specify Brass Throttle Valves.

Size	inches	¾	1	1¼	1½	2	2½
Price.....each		\$10.00	11.50	14.00	20.00	25.00	35.00

STANDARD BUTTERFLY VALVESFOR STEAM WORKING PRESSURES UP TO 125 POUNDS
THESE VALVES ARE NOT INTENDED TO BE STEAM TIGHT

Size.....inches	¾	1	1¼	1½	2	2½	3
Price.....each	\$3.10	4.40	5.65	6.75	10.00	13.75	21.00

These Valves can be supplied with a Brass Stem, instead of Steel Stem, at an extra price.
Always specify Brass Butterfly Valves, otherwise sizes 2 inch and larger will be furnished in iron.

IRON BODY BRASS TRIMMINGS

Size.....inches	2	2½	3	3½	4	5	6	8	10	12	14	16
End to End, Screwed.....	4¼	4¾	5¼	5½	6	6¾	7½	9	10¾	12½	14	16
Face to Face, Flanged.....	4¼	4¾	5¼	5½	6	6¾	7½	9¼	10¾	12½	14	16
Diam. Flanges.....inches	6	7	7½	8½	9	10	11	13½	16	19	21	23½
Price, Screwed.....each	\$8.00	9.50	12.00	16.00	18.50	28.50	42.50	.....	.....	.....	.....	.....
Price, Flanged....."	\$9.50	11.50	15.00	19.00	22.00	32.00	47.00	90.00	125.00	160.00	275.00	350.00

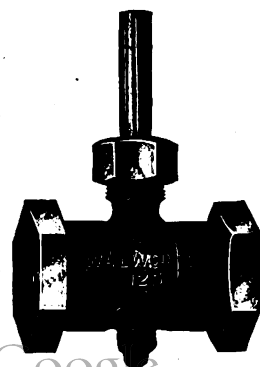
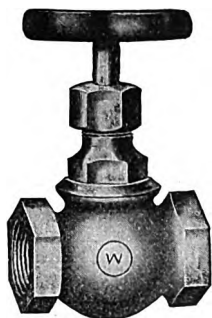


FIG. 2301

STANDARD BRASS VALVES

WITH BRASS DISC

SIZES 3-INCH AND SMALLER, FOR STEAM WORKING PRESSURES UP TO 125 POUNDS;
SIZES 3½ AND 4-INCH UP TO 100 POUND

GLOBE—FIG. 2307

ANGLE—FIG. 2308
SCREWED ENDS

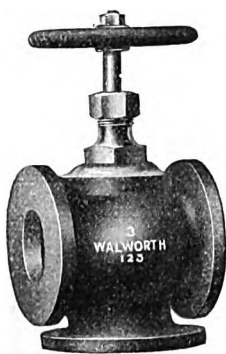
CROSS—FIG. 2309

Size	inches	1/8	1/4	3/8	1/2	3/4	1	1 1/4
Price, Globe.....each		\$.72	.72	.77	1.00	\$1.26	\$1.80	2.52
" Angle....."		\$.72	.72	.77	1.00	1.26	1.80	2.52
" Cross....."		...	\$1.25	1.25	1.50	2.00	2.50	3.50

Size	inches	1 1/2	2	2 1/2	3	3 1/2	4	....
Price, Globe.....each		\$3.50	5.30	10.00	14.40	26.50	36.00	....
" Angle....."		\$3.50	5.30	10.00	14.40	26.50	36.00	....
" Cross....."		\$5.00	8.00	16.00	24.00	.....	.....	....

STANDARD IRON BODY VALVESBRASS MOUNTED. FOR 125 POUNDS STEAM WORKING PRESSURE
SCREWED

Size	inches	1	1 1/4	1 1/2	2	2 1/2	3
Price, Globe or Angle.....each		\$2.25	2.75	3.50	5.40	7.35	9.80
" Cross.....each		\$6.50	9.00	12.50

FLANGED

GLOBE—FIG. 2310



ANGLE—FIG. 2311



CROSS—FIG. 2312

Size	inches	1	1 1/4	1 1/2	2	2 1/2	3
Dia. of Flanges.....inches		4	4 1/2	5	6	7	7 1/2
Price, Globe or Angle.....each		\$3.25	3.85	4.80	7.00	9.00	12.50
Price, Cross....."		\$9.00	11.75	16.50

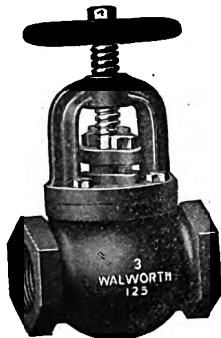
ALL IRON, GLOBE AND ANGLE VALVES

All iron valves are specially adapted for use in systems where it is necessary to handle alkaline, cyanide or other acetous solutions. Specify clearly when all iron valves are wanted.

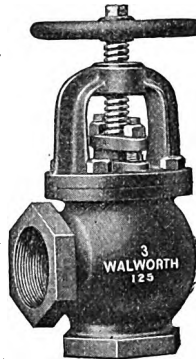
Size	inches	1	1 1/4	1 1/2	2	2 1/2	3
Price, Screwed.....each		\$5.70	6.00	6.60	7.50	9.40	12.50
Price, Flanged....."		\$6.90	7.25	7.80	9.00	11.50	16.50

STANDARD IRON BODY VALVES

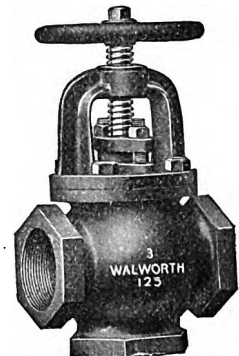
BRASS TRIMMINGS, WITH YOKE
FOR STEAM WORKING PRESSURES UP TO 125 POUNDS



GLOBE
FIG. 2313



ANGLE
FIG. 2314



CROSS
FIG. 2315

GLOBE, ANGLE AND CROSS, SCREWED

Size.....inches	2	2½	3	3½	4	4½	5	6	7	8	10	12
Price, Globe or Angle.....each	\$7.00	9.00	12.50	15.25	19.00	24.00	27.00	37.50	63.00	72.00	114.00	170.00
Price, Cross....."	\$8.50	11.75	16.25	20.00	23.50	30.65	35.25	47.25	78.00	92.00	162.00	240.00

GLOBE, ANGLE AND CROSS, FLANGED

Size.....inches	2	2½	3	3½	4	4½	5	6	7	8	10	12	14	15	16
Diam. of Flanges.....inches	6	7	7½	8½	9	9½	10	11	12½	13½	16	19	21	22½	23½
Price, Globe or Angle.....each	\$ 8.60	10.75	15.00	18.50	22.50	27.50	31.00	42.00	68.00	77.00	123.00	187.00	350.00	.....	475.00
Price, Cross....."	\$11.00	14.50	20.00	25.00	28.50	36.00	41.00	54.00	85.00	100.00	175.00	265.00	.....	.....	.....

All Iron Valves made to order at special prices.

STANDARD BRASS BODY GATE VALVES

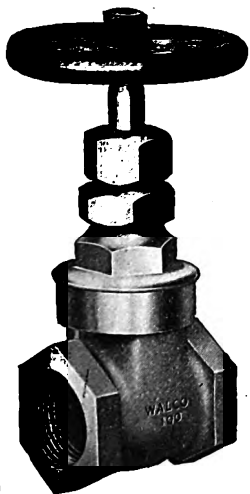
FOR WORKING PRESSURES UP TO 150 POUNDS

SCREWED

Size.....inch	¼	¾	½	¾	1	1¼	1½	2	2½	3
Price.....each	\$1.45	1.45	1.65	2.05	2.80	3.70	5.00	7.30	13.00	19.00

FLANGED

Size.....inches	2	2½	3
Diam. Flanges.....inches	6	7	7½
Face to Face....."	5½	6	6½
Price.....each	\$25.00	33.00	39.00



SCREWED
FIG. 2316

"CLIP" GATE VALVES

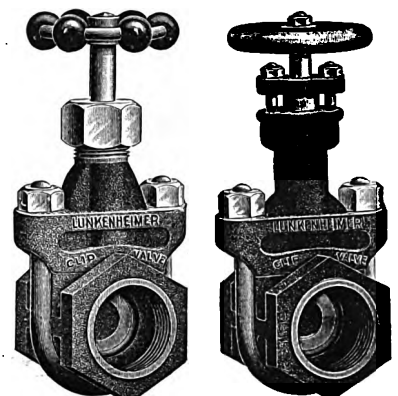
LUNKENHEIMER, DOUBLE SEATED
FOR WORKING PRESSURES UP TO 100 POUNDS

IRON BODY, BRONZE MOUNTED, SCREWED ENDS

Size.. inches	½	¾	1	1¼	1½	2	2½	3	3½	4
Price.....each	\$2.00	2.35	2.50	3.50	5.00	7.50	12.00	15.00	20.00	22.00

ALL IRON, SCREWED ENDS

Size.....inches	½	¾	1	1¼	1½	2	2½	3	3½	4
Price.....each	\$2.00	2.35	2.50	3.50	5.00	7.50	12.00	15.00	18.00	20.00

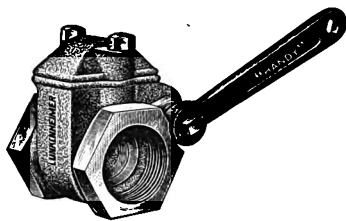


½ TO 2 INCHES
FIG. 2317

2½ TO 6 INCHES
FIG. 2317½

HANDY GATE VALVES

FOR WORKING PRESSURES NOT EXCEEDING
75 POUNDS



NO. 430, BRONZE
FIG. 2302



NO. 628, IRON BODY BRONZE MOUNTED
FIG. 2303

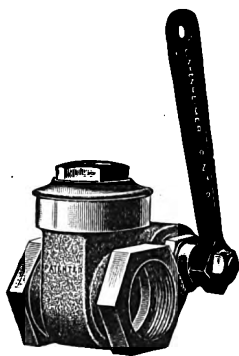
Designed for low pressure steam, water, gas, oils, etc., for use in oil refineries, breweries, tanneries, pulp and chemical fiber mills, soap, varnish and white lead works, creameries, canning and packing establishments; also on low pressure steam and hot water heating apparatus, laundry and wool washing machinery, railroad water stations, etc., or wherever a lever quick opening valve is wanted for pressures not exceeding 75 pounds.

Size.....inches	$\frac{1}{2}$	$\frac{3}{4}$	1	$1\frac{1}{4}$	$1\frac{1}{2}$	2	$2\frac{1}{2}$
Price, No. 430, Bronze.....each	\$1.60	1.80	2.50	3.50	5.00	7.50	13.50
" " 628, Iron Body....."	.....	.....	5.00	5.50	6.00	7.00	12.00
" " 322, All Iron....."	.....	4.80	5.00	5.50	6.00	7.00	12.00

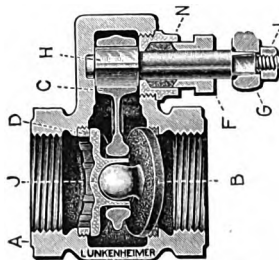
Size.....inches	3	$3\frac{1}{2}$	4	$4\frac{1}{2}$	5	6	8
Price, No. 430, Bronze.....each	\$19.00	40.00	60.00	.....	.....	.....	.....
" " 628, Iron Body....."	\$15.00	18.00	21.00	25.00	30.00	42.00	90.00
" " 322, All Iron....."	\$15.00	18.00	21.00	25.00	30.00	42.00	90.00

LEVER THROTTLE VALVES—SPECIAL HEAVY PATTERN

SIZES $\frac{1}{4}$ TO 3-INCH, INCLUSIVE, FOR WORKING PRESSURES UP TO 175 POUNDS; $3\frac{1}{2}$ AND 4-INCH, UP TO 125 POUNDS; 5 AND 6-INCH, UP TO 100 POUNDS



NO. 431, BRONZE
FIG. 2304



SECTIONAL VIEW OF IRON BODY
FIG. 2305



NO. 432, IRON BODY BRONZE MOUNTED
FIG. 2306

Size.....inches	$\frac{1}{4}$	$\frac{3}{4}$	1	$1\frac{1}{4}$	$1\frac{1}{2}$	2
Price, No. 431, Bronze Body.....each	\$2.50	3.00	4.00	5.00	7.00	10.00
" " 432, Iron "....."	.....	.....	.....	.....	.....	8.50

Size.....inches	$2\frac{1}{2}$	3	$3\frac{1}{2}$	4	5	6
Price, No. 431, Bronze Body.....each	\$19.00	.....	.....	.....	.....	.....
" " 432, Iron "....."	\$16.00	20.00	25.00	30.00	35.00	40.00

Handy Gate and Lever Throttle Valves made with screwed ends only.

IRON BODY BRONZE MOUNTED DOUBLE DISC GATE VALVES

Sizes 2 to 12 inch, 125 pounds working pressure 300 pounds test
 Sizes 14 to 24 inch, 75 pounds working pressure 175 pounds test
 Sizes 26 inch and above, 60 pounds working pressure 150 pounds test

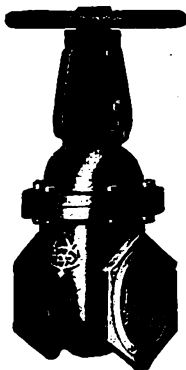


FIG. 2318
STATIONARY SPINDLE
SCREW END

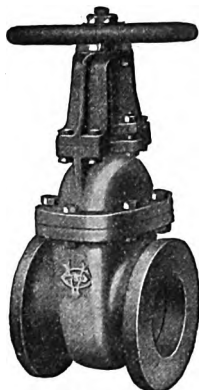


FIG. 2319
STATIONARY SPINDLE
FLANGE END

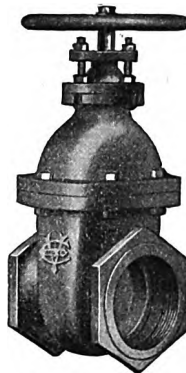


FIG. 2320
RISING SPINDLE
SCREW END



FIG. 2321
RISING SPINDLE
FLANGE END

Size	2	2½	3	3½	4	4½	5
Fig. 2318.....	\$10.00	\$11.50	\$14.00	\$17.00	\$19.00	\$24.00	\$27.50
Fig. 2319.....	12.00	13.50	16.50	19.50	23.00	28.00	31.50
Fig. 2320, with Bronze Stem.....	19.00	20.50	23.50	27.00	32.50	40.00	45.00
Fig. 2321, with Bronze Stem.....	21.00	22.50	26.00	29.50	36.50	44.00	49.00
Fig. 2320, with Steel Stem.....	17.50	19.00	22.00	25.00	30.00	37.00	42.00
Fig. 2321, with Steel Stem.....	19.50	21.00	24.50	27.50	34.00	41.00	46.00
Fig. 2318, Fig. 2320, End to End.....	5½	5½	6¾	6¾	7½	8	8½
Fig. 2319, Fig. 2321, Face to Face.....	7	7½	8	8½	9	9½	10
Fig. 2310, Fig. 2321, Diameter of Flanges.....	6	7	7½	8½	9	9¾	10

Size	6	7	8	9	10	12
Fig. 2318.....	\$32.50	\$45.00	\$54.00	.....	.....	.....
Fig. 2319.....	36.50	49.00	58.00	\$ 81.00	\$ 95.00	\$133.00
Fig. 2320, with Bronze Stem.....	52.00	69.00	86.00	.....	.....	.....
Fig. 2321, with Bronze Stem.....	56.00	73.00	90.00	118.00	136.00	180.00
Fig. 2320, with Steel Stem.....	48.00	64.00	80.00	105.00	122.00	160.00
Fig. 2321, with Steel Stem.....	52.00	68.00	84.00	110.00	127.00	168.00
By-Pass Extra.....	36.00	36.00	36.00	45.00	45.00	45.00
Fig. 2318, Fig. 2319, End to End.....	9¼	9½	10	.....	.....	.....
Fig. 2319, Fig. 2321, Face to Face.....	10½	11	11½	12	13	14
Fig. 2319, Fig. 2321, Diameter of Flanges.....	11	12½	13½	15	16	19

Size	14	16	18	20	22	24	30	36	42	48
Fig. 2319.....	\$181.00	\$260.00	\$350.00	\$425.00	\$530.00	\$600.00	\$1110.00	.....	.....	.....
Fig. 2321, with Bronze Stem.....	255.00	350.00	470.00	565.00	700.00	777.00	1400.00	.....	.....	.....
Fig. 2321, with Steel Stem.....	236.00	325.00	435.00	525.00	650.00	725.00	1300.00	.....	.....	.....
Bevel Gearing Extra.....	45.00	45.00	45.00	45.00	55.00	55.00	67.50	.....	.....	.....
Spur Gearing Extra.....	40.00	40.00	40.00	40.00	50.00	50.00	57.00	.....	.....	.....
Gear Indicator Extra.....	22.50	22.50	22.50	22.50	22.50	22.50	30.00	.....	.....	.....
By-Pass Extra.....	45.00	67.00	67.00	67.00	89.00	89.00	89.00	.....	.....	.....
Fig. 2319, Fig. 2321, Face to Face.....	14	14¾	15½	17	18	18½	21½	24½	27½	30½
Fig. 2319, Fig. 2321, Diameter of Flanges.....	21	23½	25	27½	29½	32	38¾	46	53	59½

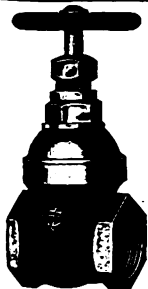


FIG. 2223—Screw End

BRONZE GATE VALVE

125 pounds working pressure 300 pounds test

Size	¼	⅜	½	¾	1	1¼	1½	2	2½	3
Price each	\$1.45	1.45	1.65	2.05	2.80	3.70	5.00	7.30	13.00	19.00

We furnish these valves with "T" heads or square nuts on the spindles, without extra charge.

STERLING STEAM TRAP

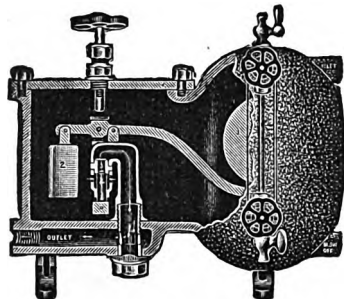


FIG. 2333

SHOWING QUICK REMOV-
ABLE MECHANISM—WITH-
OUT BREAKING PIPE
CONNECTIONS

A glance will suffice to show the simplicity of construction. A counter-balanced float (1) operates vertical valve (4) hung on rods from float lever. By unscrewing nut (5) the whole internal mechanism can be lifted out at once, through flange opening.

All parts interchangeable.

The only steam trap wherein you do not have to break any pipe connections to get a part out of the casing. One operation removes all parts at once.

The ingenious combination of balanced float, and vertical valve dropping from its seat overcomes the friction found in all other float traps, and the obvious result is greater discharge capacity, with elimination of wire drawing in valve.

Valve and seat are Government metal and always under water seal.

Made in three series; to enable the purchaser to determine at a glance the trap that will suit his particular pressure.

STERLING INDESTRUCTIBLE FLOAT

SEAMLESS—ALL COPPER

This float is reinforced to the highest obtainable degree of rigidity without sacrificing its lightness by means of ring stay and post, as seen in cut.

Built for hard service.

Every float thoroughly tested with extreme heat and pressure test.

In its finished state, a seamless float, immune from collapse.

PRESSURE 0 TO 30 LBS. SERIES NO. 1

Size No.	0	1	2	3	4	5	6	20	21	22	23	24	25	26
Pipe Connection	1/2"	3/4"	1"	1 1/4"	1 1/2"	2"	2 1/2"	1 1/2"	3/4"	1"	1 1/4"	1 1/2"	2"	2 1/2"
*Condensation	1,200	2,100	3,500	5,400	7,500	11,000	18,000	1,200	2,100	3,500	5,400	7,500	11,000	18,000
Lineal ft. of 1-in. Pipe	2,400	4,000	7,000	12,000	16,000	25,000	40,000	2,400	4,000	7,000	12,000	16,000	25,000	40,000
Dimensions, inches	11 1/2 x 12 x 7 1/2	13 x 14 x 8 1/2	14 1/2 x 9 x 9 1/2	15 x 17 x 10	16 x 18 x 10 1/2	18 x 19 x 11 1/2	18 x 20 x 12	11 1/2 x 13 x 14	14 x 15 x 17	16 x 18 x 19	18 x 19 x 20	18 x 19 x 20	18 x 19 x 20	18 x 19 x 20
Weight, lbs.	65	75	95	110	130	150	180	65	75	95	110	130	150	180
Price	\$37.50	40.50	49.50	60.00	82.50	105.00	165.00	37.50	40.50	49.50	60.00	82.50	105.00	165.00

PRESSURE 0 TO 150 LBS. SERIES NO. 2

PRESSURE 0 TO 225 LBS. SERIES NO. 3

Size No.	31	32	33	34	35	36
Pipe Connection	3/4"	1"	1 1/4"	1 1/2"	2"	2 1/2"
*Condensation	2,100	3,500	5,400	7,500	11,000	18,000
Lineal ft. of 1-in. Pipe	4,000	7,000	12,000	16,000	25,000	40,000
Pipe Dimensions, ins.	13 x 14 x 8 1/2	14 x 15 x 9	15 x 17 x 9 1/2	16 x 18 x 10	18 x 19 x 10 1/2	18 x 20 x 12
Price	\$60.00	72.00	90.00	120.00	150.00	225.00

Traps working on back pressure should have a check valve on discharge pipe.

All tests under maximum pressure, approximated.

*Condensation in pounds per hour.

Overhauling a trap formerly requiring hours to accomplish, can now be done in a few minutes.

PRICE LIST

Part No.	Trap No.	Price Each	Part No.	Trap No.	Price Each
1	1 & 21	\$4.50	8	All Numbers	\$2.25
	2, 3, 22, 23, 31	5.25	9	All Numbers	2.63
	4, 24, 32 & 33	6.00	10 & 11	All Numbers	.30
	5, 25 & 34	7.50	12	All Numbers	.90
	6, 26 & 35	9.00	13	All Numbers	.23
	36	10.50		1, 2, 3, 21, 22, 23, 31, 32 & 33	.90
2	1, 2, 21, 22, 31 & 32	.38	14	4, 5, 6, 24, 25, 26, 34, 35 & 36	1.13
	3, 4, 23, 24, 33 & 34	.45	15	All Numbers	.75
	5, 6, 25, 26, 35 & 36	.60	16	All Numbers	1.13
3 & 4	1, 2, 3, 21, 22, 23, 24, 25,	1.20	17	All Numbers	.90
	26, 31, 32, 33, 34, 35 & 36	1.50	18	1, 2, 21, 22, 31 & 32	1.20
	4 & 5	2.25	19	3, 4, 23, 24, 33 & 34	1.50
5	6	2.25	20	5, 25 & 35	1.83
	1, 2, 3, 21, 22, 23, 31, 32 & 33	3.00	21	6, 26 & 36	2.23
	4, 5, 24, 25, 34 & 35	3.75	22	1, 2, 3, 21, 22, 23, 31, 32 & 33	2.25
	6, 26 & 36	21.00	23	4, 5, 24, 25, 34 & 35	3.00
		22.50	24	6, 26 & 36	3.75
6	31	22.50		All Numbers	.08
	32	27.00	24	All Numbers	.33
	33	33.00			
	34	42.00			
	35	48.00			
	36	54.00			
	1 & 21	\$2.25			
	2 & 22	2.63			
	3, 23 & 31	3.00			
	4, 24 & 33	4.50			
7	5, 25 & 34	6.00			
	6, 26 & 35	7.50			
	36	9.00			
	32	3.75			

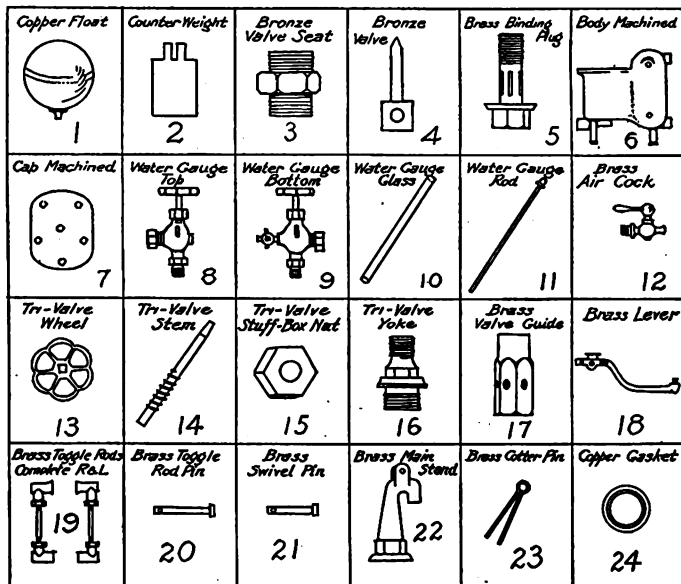


FIG. 2335

AIR COCKS



FIG. 2229

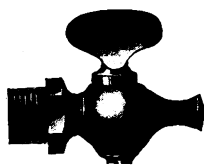


FIG. 2230

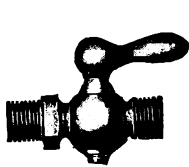


FIG. 2231

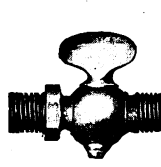


FIG. 2232

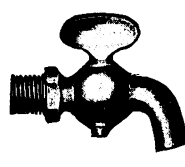


FIG. 2233

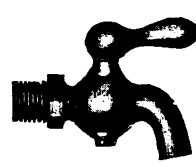


FIG. 2234



FIG. 2235

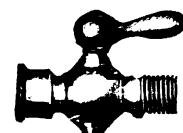


FIG. 2236

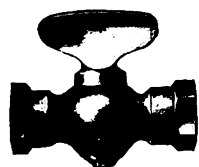


FIG. 2237

Size Inch	STRAIGHT NOSE		MALE BOTH ENDS		PLAIN BIBB NOSE		THREADED BIBB NOSE	
	Tee Handle	Lever Handle	Tee Handle	Lever Handle	Tee Handle	Lever Handle	Tee Handle	Lever Handle
1/8	\$.40	\$.55	\$.55	\$.70	\$.70	\$.85	\$.80	\$.95
1/4	.45	.60	.65	.80	.80	.95	1.00	1.15
3/8	.50	.65	.75	.90	.90	1.05	1.10	1.25
1/2	.60	.75	.90	1.05	1.00	1.15	1.35	1.50
3/4	.90	1.05	...	...	...	...	...	...
1	1.15	1.30	...	...	...	...	...	...



FIG. 2238

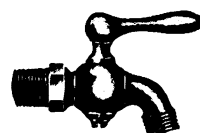


FIG. 2239

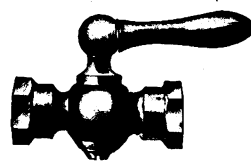


FIG. 2240

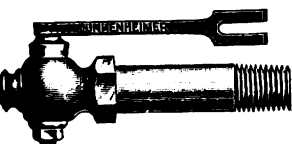
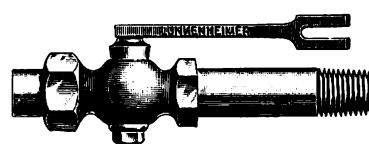
Size Inch	MALE AND FEMALE		FEMALE BOTH ENDS	
	Tee Handle	Lever Handle	Tee Handle	Lever Handle
1/8	\$.75	\$.90	\$.75	\$.90
1/4	.85	1.00	.85	1.00
3/8	.95	1.10	.95	1.10
1/2	1.15	1.30	1.15	1.30

LEVER HANDLE CYLINDER COCKS

FOR TRACTION ENGINES

With the exception of the 1/8 and 1/4-inch sizes, the unions on lever handle and traction cocks are made one size smaller than the shank, unless otherwise specified. These can be supplied with blank shank, but an extra charge will be made when so furnished.

Unless otherwise ordered, lever handle cocks without unions will be sent with angle, and "T" handle with straight outlets.

WITHOUT UNION
FIG. 2241WITH UNION
FIG. 2242

Size.....inches	1/8	1/4	3/8	1/2	3/4
Price, without Union, each	\$1.15	\$1.30	\$1.80	\$2.50	\$4.10
" " with Union.... "	1.70	1.80	1.95	2.90	5.30

GAUGE COCKS

POLISHED BRASS

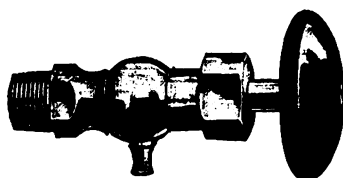


FIG. 5047—WITH STUFFING BOX

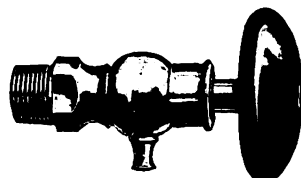
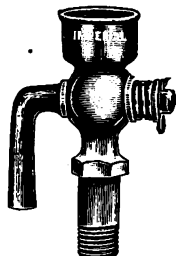


FIG. 5048—WITHOUT STUFFING BOX

Pipe Connection, inches	3/8	1/2	3/4
Price Each, with Stuffing Box	\$1.20	1.30	1.45
" " Without Stuffing Box	\$.95	1.00	1.25

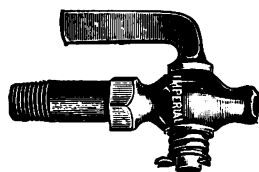
COMBINED PRIMING CUPS AND RELIEF COCKS**POLISHED BRASS**

NOS. 7E & 8E
FIG. 2245

No.	Handle	Size Inch	Thread	Price Each
5E	Lever, Short Shank	$\frac{1}{8}$	I. P.	\$.75
6E	Lever, Short Shank	$\frac{1}{4}$	I. P.	1.00
7E	Lever, Shank $\frac{7}{8}$ inch.	$\frac{1}{8}$	I. P.	.85
8E	Lever, Shank $\frac{7}{8}$ inch	$\frac{1}{4}$	I. P.	1.40



NOS. 5E & 6E
FIG. 2251

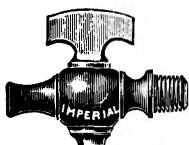
POLISHED BRASS, STRAIGHT LEVER HANDLE, ANGLE SHANK

NOS. 20E & 21E
FIG. 2255

No.	Shank	Size Inch	Thread	Price Each
11E	Angle Shank	$\frac{1}{8}$	I. P.	\$.85
12E	Angle Shank	$\frac{1}{4}$	I. P.	1.35



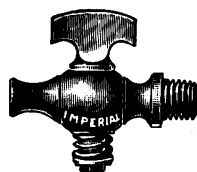
NOS. 11E & 12E
FIG. 2253

DRAIN AND RELIEF COCKS**BRASS**

NOS. 33E & 34E
FIG. 5055



NO. 41E
FIG. 2257



NOS. 37E & 38E
FIG. 2259

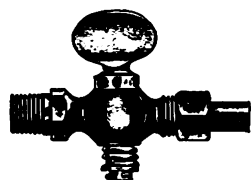
No.	Finish	Handle	Size Inch	Thread	Price Each
20E	Polished	Flat Lever	$\frac{1}{8}$	I. P.	\$.85
21E	Polished	Flat Lever	$\frac{1}{4}$	I. P.	1.25
33E	Polished	Tee	$\frac{1}{8}$	I. P.	.50
34E	Polished	Tee	$\frac{1}{4}$	I. P.	.60
37E	Polished	Tee	$\frac{1}{8}$	I. P.	.60
38E	Polished	Tee	$\frac{1}{4}$	I. P.	.75
41E	Polished	Flat Lever	$\frac{1}{8}$	I. P.	.60
42E	Bright	Flat Lever	$\frac{1}{4}$	I. P.	1.00
43E	Bright	Flat Lever	$\frac{3}{8}$	I. P.	1.25
44E	Bright	Flat Lever	$\frac{1}{2}$	I. P.	1.50



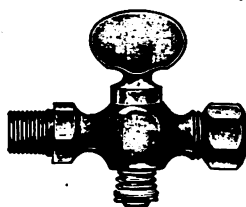
NOS. 42E, 43E & 44E
FIG. 2258

SHUT-OFF COCKS

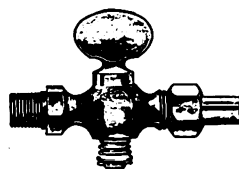
TEE HANDLE, POLISHED BRASS



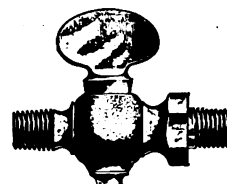
45E—FIG. 2262



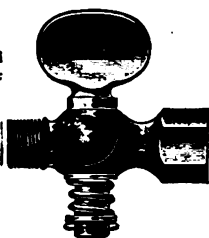
45EF—FIG. 2263



55EF—FIG. 2264

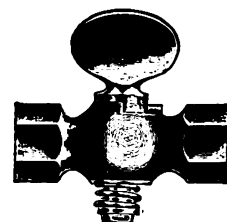


46E—FIG. 2265



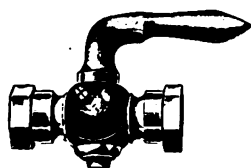
50E & 51E—FIG. 2261

No.	Size Inch	Thread	Price Each
45E	1/8	I. P. Solder Nipple for 1/4 in. O. D. Tube.....	\$.75
45EF	1/8	I. P. Compression Coupling for 1/4 in. O. D. Tube....	.75
55EF	1/8	I. P. Compression Coupling for 1/8 in. O. D. Tube....	.75
46E	1/8	I. P. Double Male.....	.75
50E	1/8	I. P. Male and Female.....	.60
51E	1/4	I. P. Male and Female.....	.75
52E	1/8	I. P. Double Female with check pin.....	.70

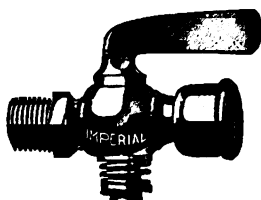


52E—FIG. 2265 1/2

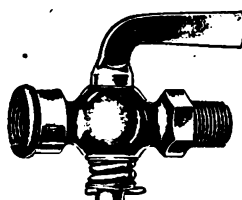
LEVER HANDLE—POLISHED BRASS



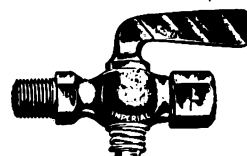
31E & 32E—FIG. 2266



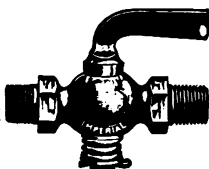
48E & 49E—FIG. 2267



74E—FIG. 2268



75EF & 76EF—FIG. 2269

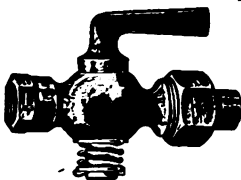


76E & 76EF—FIG. 2270

No.	Size Inch	Thread	Price Each
31E	1/8	I. P. Double Female.....	\$.75
32E	1/4	I. P. Double Female.....	.85
48E	1/8	I. P. Male and Female.....	.80
49E	1/4	I. P. Male and Female.....	.90
74E	1/8	I. P. Male and Female.....	.80
75EF	1/8	I. P. Compression Coupling for 1/8 in. O. D. Tube....	.75
76E	1/8	I. P. Double Male.....	.75
76EF	1/8	I. P. Comp. Coupling for 1/4 in. O. D. Tube.....	.75
77E	1/4	I. P. Double Male.....	.75
79EF	1/8	I. P. Comp. Coupling for either 1/4 or 1/8 in. O. D. Tube, as ordered.....	.75
82EF	1/4	I. P. Comp. Coupling for 3/8 in. Tubing.....	.80



79EF & 82EF—FIG. 2272



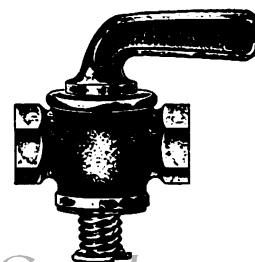
85E & 85EF—FIG. 2273

LEVER HANDLE—BRIGHT BRASS—NOTCHED SPRING KEY

85E	1/4	I. P. Female one end and solder coupling for 3/8 in. O. D. Tube, other end.....	\$1.00
85EF	1/4	I. P. Female one end, Compression Coupling for 1/8 in. O. D. Tube other end.....	1.00

BRIGHT BRASS—LEVER HANDLE AND NOTCHED SPRING KEY

No.	Size Inch	Thread	Price Each
39E	1/4	I. P. Double Female.....	\$1.25
40E	3/8	I. P. Double Female.....	1.50



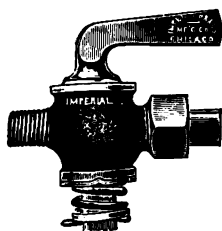


FIG. 2274
27E, 29E & 57E

GASOLINE SHUT-OFF COCKS

These Gasoline Shut-Off Cocks may be used to advantage in many places on an automobile but are specially intended for use in the Gasoline Pipe Line between the gasoline tank and carburetor for closing off the gasoline supply. They may also be used in any desired location for similar work. The phosphor bronze spring automatically takes up any slight wear on key, and also operates the notched controller, which positively holds the valve open or closed as may be desired, with no possibility of the position being changed by jarring of the engine. These Gasoline Cocks are made single and double—the single has only one brazing or soldering union, the other side being threaded I.P. Thread; and the double has two brazing or soldering unions. Unions are furnished for either $\frac{1}{4}$, $\frac{1}{8}$ or $\frac{3}{8}$ inch outside diameter tubing as may be desired.



FIG. 2275
28E, 30E & 58E

SINGLE TYPE

No.	Style	Price Each
27E	Solder Union for $\frac{1}{4}$ in. O. D. Tubing one end, $\frac{1}{2}$ in. I.P. Thread one end.....	\$1.10
29E	Solder Union for $\frac{1}{8}$ in. O. D. Tubing one end, $\frac{1}{2}$ in. I.P. Thread one end.....	1.10
57E	Solder Union for $\frac{3}{8}$ in. O. D. Tubing one end, $\frac{1}{4}$ in. I.P. Thread one end.....	1.40

DOUBLE TYPE

No.	Style	Price Each
28E	Solder Union for $\frac{1}{4}$ in. O. D. Tubing both ends.....	\$1.25
30E	Solder Union for $\frac{1}{8}$ in. O. D. Tubing both ends.....	1.25
58E	Solder Union for $\frac{3}{8}$ in. O. D. Tubing both ends.....	1.40

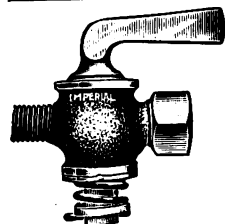


FIG. 2276
27EF, 29EF & 57EF

GASOLINE COCKS EQUIPPED WITH COMPRESSION COUPLINGS

These Shut-Off Cocks are of the same size and description as Nos. 27E to 30E inclusive, the only difference being that Nos. 27E to 30E are equipped with Solder Tube ends whereas these are equipped with Compression Couplings, and are ready to apply without any soldering or other preparatory work.



FIG. 2277
28EF, 30EF & 58EF

SINGLE TYPE

Compression Couplings for Tubing at one end. Iron Pipe Thread at one end.

No.	Size	Price Each
27EF	For $\frac{1}{4}$ in. O. D. Tubing.....	\$1.10
29EF	For $\frac{1}{8}$ in. O. D. Tubing.....	1.10
57EF	For $\frac{3}{8}$ in. O. D. Tubing.....	1.10

27EF and 29EF, $\frac{1}{2}$ in. I.P. Thread. 57EF, $\frac{1}{4}$ in. I.P. Thread.

DOUBLE TYPE

Compression Couplings for Tubing at both ends.

No.	Size	Price Each
28EF	For $\frac{1}{4}$ in. O. D. Tubing.....	\$1.25
30EF	For $\frac{1}{8}$ in. O. D. Tubing.....	1.25
58EF	For $\frac{3}{8}$ in. O. D. Tubing.....	1.25

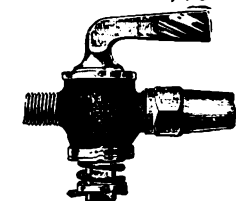


FIG. 2277 $\frac{1}{2}$
27, 29 & 57 S.A.E.

GASOLINE COCKS WITH S. A. E. THREAD

These are self-locking Gasoline Line Cocks machined with the standard threads recommended by the Standards Committee and accepted by the Society of Automobile Engineers. These can be supplied with or without the Union Nut as preferred. When ordering please state symbol number and outside diameter of tubing and advise whether nuts are desired or not.

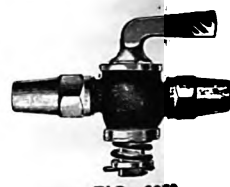


FIG. 2278
28, 30 & 58 S.A.E.

No.	For Tubing	S. A. E. Thread	Iron Pipe Thread	Price Each
27 SAE	$\frac{1}{4}$ in. Outside	$\frac{1}{16}$ x20	$\frac{1}{8}$ in.	\$1.10
28 SAE	$\frac{1}{4}$ in. Outside	$\frac{1}{16}$ x20 both ends	0	1.25
29 SAE	$\frac{1}{8}$ in. Outside	$\frac{1}{16}$ x20	$\frac{1}{8}$ in.	1.10
30 SAE	$\frac{1}{8}$ in. Outside	$\frac{1}{16}$ x20 both ends	0	1.25
57 SAE	$\frac{3}{8}$ in. Outside	$\frac{5}{8}$ x18	$\frac{1}{4}$ in.	1.10
58 SAE	$\frac{3}{8}$ in. Outside	$\frac{5}{8}$ x18 both ends.	0	1.25

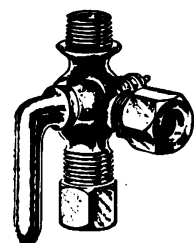


FIG. 2279
60EF & 61EF

THREE-WAY COCKS

COMPRESSION

Polished Brass. Lever Handle; with phosphor bronze spring key.

No.	Size	Price Each
60EF	Two Tubing Ends $\frac{1}{8}$ in. I. P. Thread.....	\$1.50
61EF	Two Tubing Ends $\frac{1}{4}$ in. I. P. Thread.....	1.50

IMPERIAL COMPRESSION COUPLINGS

FOR CONNECTING BRASS, COPPER, ALUMINUM AND STEEL TUBING



61F 60F 62F BODY 60F 61F
FIG. 2344



62F
FIG. 2345



62F COMPLETE (SECTION)
FIG. 2350



66F
FIG. 2351



65F
FIG. 2352



63F
FIG. 2346



73F
FIG. 2347



67F
FIG. 2353



68F
FIG. 2354



69F
FIG. 2355

Imperial Compression Couplings for connecting Copper, Brass, Aluminum and Steel Tubing, as used on Automobiles, Engines and Oilers.

Joints are made in an instant by simply inserting the end of tubing through the nut and the sleeve and tightening up the nut with a wrench.

Imperial Compression Coupling provides a safe, cheaper and better method of coupling or connecting Brass, Copper, Aluminum or Steel tubing as used on gasoline engines, automobiles, motor boats, etc., particularly for connecting up tubing used on the gasoline and oil lines.

Among the many advantages of this Compression Coupling may be mentioned: No soldering or flaring out of the tubing required, no threading necessary; simply cut off the tubing and tighten up the nut; ninety per cent saving in time, fifty cents to one dollar saved on every car, boat or engine. Joints can be quickly made by anyone. No expert labor required.

Directions for Using: First—Screw body into position; Second—Place nut on tubing; Third—Place sleeve on tubing. Shove tubing into body until it comes to shoulder stop; then screw up nut until tight.

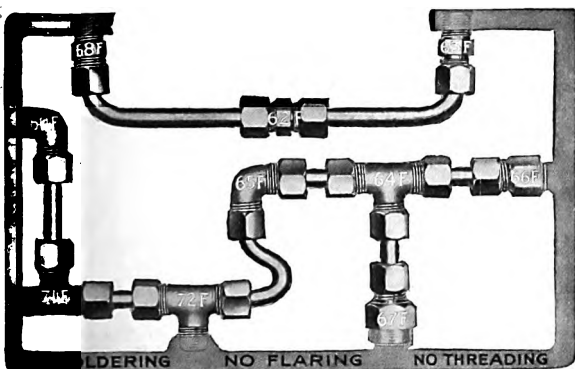


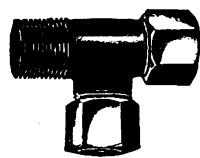
FIG. 2349

This cut illustrates the appearance of the Compression Couplings as actually used in connecting pipe, and will assist our customers in selecting the type and symbol needed to meet their exact requirements.

Standard Package Quantities: Above fittings furnished in standard packages of 50 in a box for the $\frac{1}{4}$ in. and $\frac{1}{2}$ in. sizes and 25 in a box for $\frac{3}{8}$ in. and $\frac{3}{4}$ in. sizes throughout, with the exception of 60F Sleeves all sizes of which are packed 100 in a box.



72F
FIG. 2356



71F
FIG. 2357



70F
FIG. 2358

PRICE LIST, PER 100 COMPLETE, INCLUDING NUTS AND SLEEVE

Figure	Article	For Outside Diameter Tube			
		$\frac{1}{8}$ in.	$\frac{1}{4}$ in.	$\frac{3}{8}$ in.	$\frac{1}{2}$ in.
60-F	Sleeve only	\$ 1.60	\$ 1.80	\$ 2.00	\$ 2.80
61-F	Nut only	4.40	5.40	6.40	8.00
62-F	Union	23.20	24.00	29.60	36.00
63-F	Check Valve	26.00 $\frac{1}{8}$ in. I. P. Thread	26.00 $\frac{1}{8}$ in. I. P. Thread	28.00 $\frac{1}{8}$ in. I. P. Thread	34.00 $\frac{1}{4}$ in. I. P. Thread
64-F	Tee	34.00	34.00	40.00	56.00
65-F	Elbow	24.00	24.00	29.00	38.00
66-F	Bushing	18.00 $\frac{1}{8}$ in. I. P. Tap	18.00 $\frac{1}{8}$ in. I. P. Tap	22.00 $\frac{1}{8}$ in. I. P. Tap	28.00 $\frac{1}{8}$ in. I. P. Tap
67-F	Bushing	24.00 $\frac{1}{4}$ in. I. P. Tap	26.00 $\frac{1}{4}$ in. I. P. Tap	28.00 $\frac{1}{4}$ in. I. P. Tap	34.00 $\frac{1}{4}$ in. I. P. Tap
68-F	Connector	16.00 $\frac{1}{8}$ in. I. P. Thread	16.00 $\frac{1}{8}$ in. I. P. Thread	18.00 $\frac{1}{8}$ in. I. P. Thread	25.00 $\frac{1}{4}$ in. I. P. Thread
69-F	Elbow	19.00 $\frac{1}{8}$ in. I. P. Thread	19.00 $\frac{1}{8}$ in. I. P. Thread	22.00 $\frac{1}{8}$ in. I. P. Thread	28.00 $\frac{1}{4}$ in. I. P. Thread
70-F	Elbow	20.00 $\frac{1}{8}$ in. I. P. Tap	20.00 $\frac{1}{8}$ in. I. P. Tap	24.00 $\frac{1}{8}$ in. I. P. Tap	28.00 $\frac{1}{4}$ in. I. P. Tap
71-F	Tee	28.00 $\frac{1}{8}$ in. I. P. Thread	32.00 $\frac{1}{8}$ in. I. P. Thread	40.00 $\frac{1}{8}$ in. I. P. Thread	48.00 $\frac{1}{4}$ in. I. P. Thread
72-F	Tee	28.00 $\frac{1}{8}$ in. I. P. Thread	32.00 $\frac{1}{8}$ in. I. P. Thread	40.00 $\frac{1}{8}$ in. I. P. Thread	48.00 $\frac{1}{4}$ in. I. P. Thread
73-F	Ell Check Valve	28.00 $\frac{1}{8}$ in. I. P. Thread	30.00 $\frac{1}{8}$ in. I. P. Thread	32.00 $\frac{1}{8}$ in. I. P. Thread	44.00 $\frac{1}{4}$ in. I. P. Thread

The Iron Pipe Threads mentioned in above list are our standard stock sizes. Other sizes of pipe threads furnished when desired. Imperial Compression Couplings for other sizes of Tubing furnished when required.



SOLDERLESS CONNECTIONS (BRASS)

FOR 1/4" OUTSIDE DIAMETER COPPER OR BRASS TUBING

These unions require no solder. They make up tight by simply flaring out the end of the tubing, which is easily done by using a tool with the proper taper.

It will be noted that No. 1F fitting is always the one through which the tubing is inserted, and then the end of tubing is flared out against the seat, as shown in sectional cut. The No. 1F fitting is always the one used to join the tubing to the other fittings.

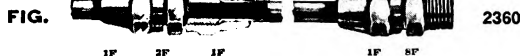
When the unions No. 1F are tightly screwed to the pieces, 2F, 3F, etc., the flared end of the tubing is held so tightly in place that there is no liability of the tubing becoming disengaged, and an absolutely tight joint is thereby effected.

PRICE LIST

No.		Price Each	No.		Price Each
1F	Female Connector.....	\$.10...	7F	Bushing to 1/4" I. P.....	\$.15
2F	Male Connector.....	.12...	8F	Male Connector.....	.12
3F	Check Valve.....	.20...	9F	Elbow.....	.15
4F	Tee.....	.18...	27F	Tee.....	.18
5F	Elbow.....	.15...	28F	Tee.....	.18
6F	Bushing to 1/8" I. P.....	.12...			

The illustrations above represent our very complete line of Brass Solderless Unions and Fittings for quarter-inch diameter copper and brass tubing. The assortment includes Ells, Tees and Unions of sufficient variety to make up almost all combinations of piping. The threads are standard iron pipe sizes, some straight and others tapered.

The No. 1F fittings are made with seat to receive the flared out end of the tubing and are threaded 1/8" iron pipe size straight thread; other fittings (2F, 3F, etc.) to which the No. 1F are screwed are also threaded 1/8" iron pipe straight thread. The ends of fittings for screwing into a tank, cylinder or any part of the machine, are threaded 1/8" iron pipe size — taper thread. For instance the No. 8F fitting is threaded straight 1/8" iron pipe thread on one end, and tapered 1/8" iron pipe thread on the other end. The No. 1F screws on the straight thread end of the No. 8F and any 1/8" iron pipe thread fits the other end of No. 8F. The straight thread of No. 8F makes up tight on the flared end of tubing and the tapered thread of No. 8F makes up tight when screwed into any 1/8" standard iron pipe fitting.



Please note that the No. 1F is threaded to fit No. 2F, 3F and all the other styles, and is the fitting designed to receive and hold the quarter-inch tubing. Numbers 2F, 4F and 5F are threaded to fit No. 1F and are used with No. 1F only.

Nos. 3F, 6F, 7F, 8F and 9F are threaded on one end to fit the No. 1F and on the other end are threaded standard 1/8" iron pipe tapered thread.

No. 27F is threaded to fit No. 1F at one end and in the middle, and standard 1/8" iron pipe tapered thread at the other end.

No. 28F is threaded to fit No. 1F at the opposite ends and standard 1/8" iron pipe tapered thread in the middle.

No. 3F is a reversible Ball Check Valve machined with seat at both ends. The ball can be located at either end, according to direction in which the check is desired to operate.

FOR 1/8" OUTSIDE DIAMETER BRASS OR COPPER TUBING

The connections described below and illustrated on page 637 are for use with 1/8" outside diameter copper or brass tubing, and make up a tight joint without using any solder. The same general description as given above apply to these fittings, with the exception that these fittings are for 1/8" outside diameter tubing and are threaded 1/4" iron pipe size, while those above are for 1/4" outside diameter tubing and are threaded 1/8" iron pipe size.

The connector No. 10F receives and holds the tubing, which is flared out after being slipped through the connector.

Please note that the No. 10F is threaded to fit No. 11F, 12 F, and all the other styles, and is the fitting designed to receive and hold the 1/8" tubing.

No. 12F is a reversible Ball Check Valve machined with seat at both ends. The ball can be located at either end, according to direction in which the check is desired to operate.

PRICE LIST

No.		Price Each	No.		Price Each
10F.	Female Connector.....	\$.15	16F.	Bushing to 3/8" I. P.....	\$.25
11F.	Male Connector—Tubing 2 ends.....	.20	17F.	Male Connector—Tubing 1 end, 1/4" I. P.	
12F.	Check Valve—Tubing 1 end, 1/4" I. P. Thread .			Thread 1 end.....	.20
	1 end.....	.40	18F.	Bushing to 1/8" I. P.....	.20
13F.	Tee—Tubing 3 ends.....	.25	19F.	Elbow—Tubing 1 end, 1/4" I. P. Thread 1 end.	.20
14F.	Elbow—Tubing 2 ends.....	.20	29F.	Tee—Tubing 2 ends, 1/4" I. P. Thread 1 end....	.25
15F.	Bushing to 1/4" I. P.....	.20	30F.	Tee—Tubing 2 ends, 1/4" I. P. Thread 1 end....	.25

SOLDERLESS CONNECTIONS (BRASS)

FOR $\frac{1}{8}$ " OUTSIDE DIAMETER BRASS OR COPPER TUBING

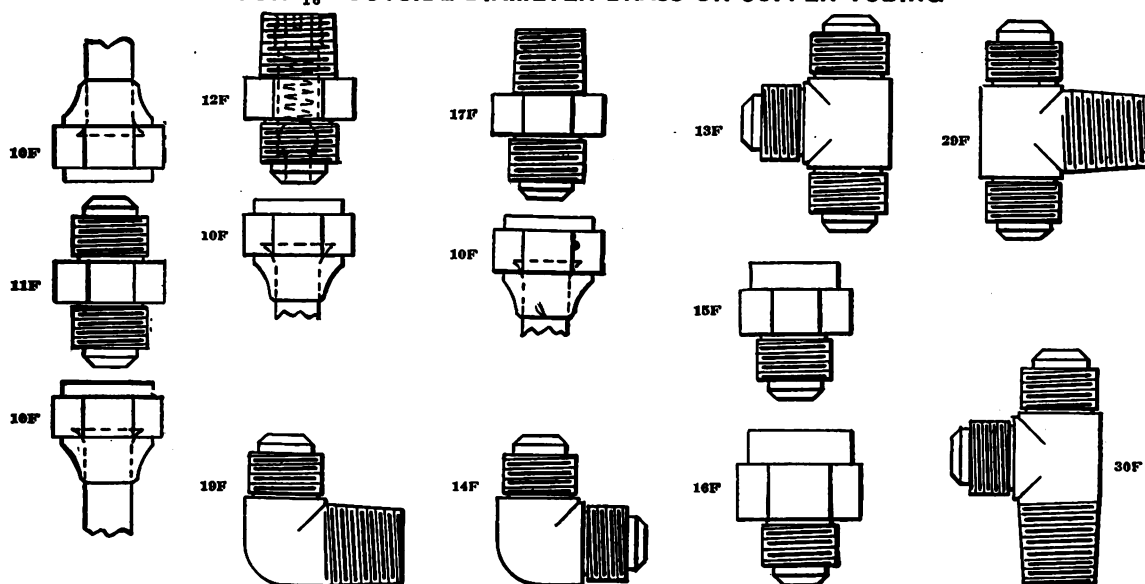
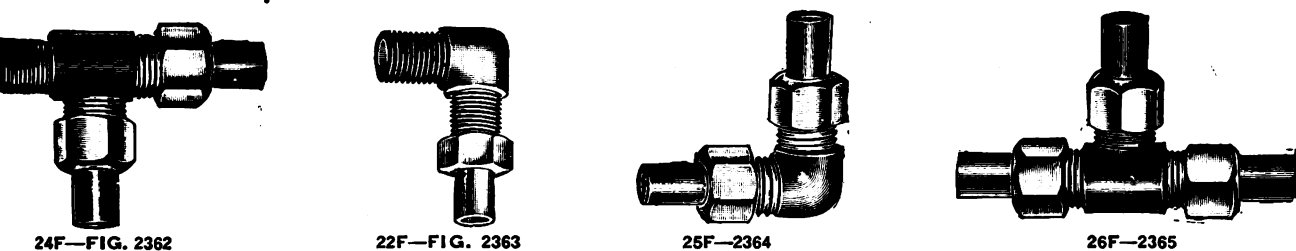


FIG. 2361

SOLDER OR BRAZING CONNECTIONS (BRASS)

FOR $\frac{1}{8}$ ", $\frac{1}{4}$ ", $\frac{3}{8}$ ", AND $\frac{1}{2}$ " INCH OUTSIDE DIAMETER BRASS OR COPPER TUBING

These fittings are carefully machined of the best quality of brass, and when soldered or brazed to tubing, form an absolutely tight joint that will not break or jar loose.

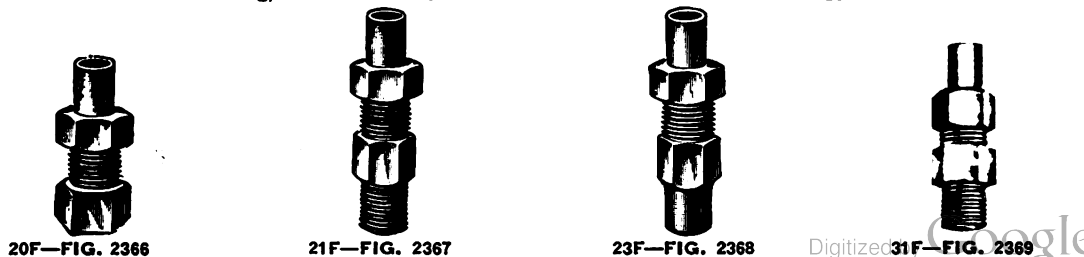


PRICE LIST

For $\frac{1}{8}$ -in. and $\frac{1}{4}$ -in. Outside Diam. Tubing			For $\frac{3}{8}$ -inch Outside Diameter Tubing.		
No.		Price Each	No..		Price Each
20F.	Female Connector, $\frac{1}{8}$ " I. P. Thread.....	\$.20	20F.	Female Connector, $\frac{1}{8}$ " I. P. Thread.....	\$.25
21F.	Male Connector, $\frac{1}{8}$ " I. P. Thread.....	.20	21F.	Male Connector, $\frac{1}{8}$ " I. P. Thread.....	.25
22F.	Elbow, $\frac{1}{8}$ " I. P. Thread.....	.25	22F.	Elbow, $\frac{1}{8}$ " I. P. Thread.....	.30
23F.	Coupling.....	.20	23F.	Coupling.....	.25
24F.	Tee, (2 Tubing Ends, 1 iron pipe thread end.) $\frac{1}{8}$ " I. P. Thread.....	.30	24F.	Tee, (2 Tubing Ends, 1 iron pipe thread end.) $\frac{1}{8}$ " I. P. Thread.....	.35
25F.	Elbow, 2 Tubing Ends.....	.28	25F.	Elbow, 2 Tubing Ends.....	.35
26F.	Tee, 3 Tubing Ends.....	.35	26F.	Tee, 3 Tubing Ends.....	.40
27F.	Check Valve, $\frac{1}{8}$ " I. P. Thread.....	.40	27F.	Check Valve, $\frac{1}{8}$ " I. P. Thread.....	.50

Other sizes furnished to order.

For $\frac{3}{8}$ " Outside Diameter Tubing, use the same symbols. Add ten cents each to list of $\frac{1}{8}$ ".



S. A. E. FLARED TUBE UNIONS—ELLS—TEES

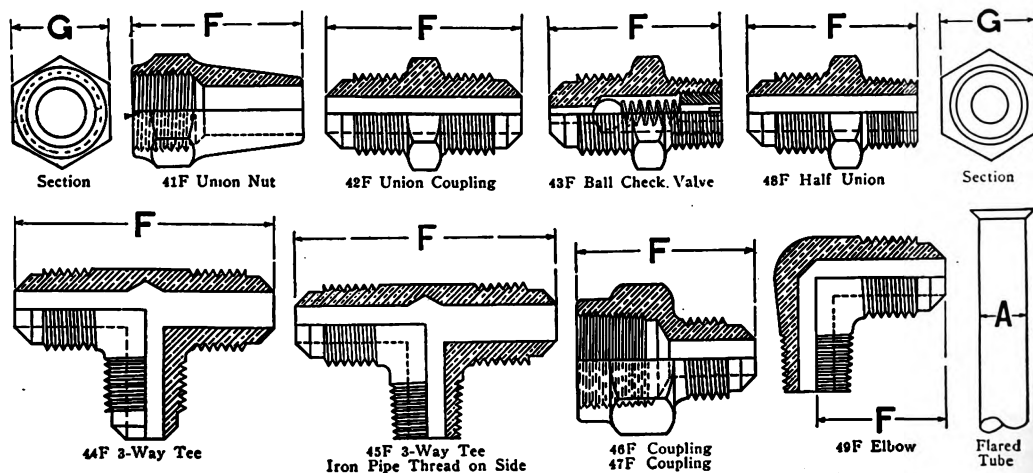


FIG. 2370

In using these unions the end of the tubing is flared out with a tapered tool. No. 41-F Union is always the one through which the tubing is passed. The tubing is flared against the seat of this fitting and the desired male connection screwed into place. Where this is done a thoroughly tight joint is effected.

The S. A. E. Fittings listed below were adopted as a standard by the Society of Automobile Engineers, June, 1912. They are made of heavier stock and will withstand wear better than other types of unions.

PRICE LIST

No. and Name	Description	Outside Diameter Tube					No. and Name	Description	Outside Diameter Tube				
		1/4"	1/2"	3/8"	1/2"	1/2"			1/4"	1/2"	3/8"	1/2"	1/2"
41F Union Nut	List S. A. E. Thread Iron Pipe Thread F G	\$.20 1/8"x20 1 1/8" 1 1/8"	.25 1/2"x20 1 1/8"	.35 5/8"x18 1 1/8"	.45 1 1/8"x16 1 1/8"	.50 3/4"x16 1 1/8"	45F 3-Way Tee Iron Pipe Thread on side	List S. A. E. Thread Iron Pipe Thread F G	\$.40 1/8"x20 1 1/8"	.55 1/2"x20 1 1/8"	.65 5/8"x18 1 1/8"	.70 1 1/8"x16 1 1/8"	.85 3/4"x16 1 1/8"
42F Union Coupling	List S. A. E. Thread Iron Pipe Thread F G	\$.30 1/8"x20 1 1/8"	.35 1/2"x20 1 1/8"	.45 5/8"x18 1 1/8"	.55 1 1/8"x16 1 1/8"	.60 3/4"x16 1 1/8"	46F Female Coupling	List S. A. E. Tap Iron Pipe Tap F G	\$.40 1/8"x20 1 1/8"	.45 1/2"x20 1 1/8"	.55 5/8"x18 1 1/8"	.65 1 1/8"x16 1 1/8"	.70 3/4"x16 1 1/8"
43F Ball Check Valve	List S. A. E. Thread Iron Pipe Thread F G	\$.45 1/8"x20 1 1/8"	.50 1/2"x20 1 1/8"	.60 5/8"x18 1 1/8"	.70 1 1/8"x16 1 1/8"	.75 3/4"x16 1 1/8"	47F Female Coupling	List S. A. E. Tap Iron pipe Tap F G	\$.50 1/8"x20 1 1/8"	.55 1/2"x20 1 1/8"	.65 5/8"x18 1 1/8"	.75 1 1/8"x16 1 1/8"	.80 3/4"x16 1 1/8"
44F 3-Way Tee	List S. A. E. Thread Iron Pipe Thread F G	\$.50 1/8"x20 1 1/8"	.55 1/2"x20 1 1/8"	.65 5/8"x18 1 1/8"	.70 1 1/8"x16 1 1/8"	.85 3/4"x16 1 1/8"	48F Half Union Coupling	List S. A. E. Thread Iron Pipe Thread F G	\$.30 1/8"x20 1 1/8"	.35 1/2"x20 1 1/8"	.45 5/8"x18 1 1/8"	.55 1 1/8"x16 1 1/8"	.60 3/4"x16 1 1/8"
DIRECTIONS: Place nut on pipe and flare out the end as shown in Cut "A."							49F Elbow	List S. A. E. Thread Iron Pipe Thread F G	\$.35 1/8"x20 1 1/8"	.40 1/2"x20 1 1/8"	.48 5/8"x18 1 1/8"	.53 1 1/8"x16 1 1/8"	.60 3/4"x16 1 1/8"

ASSORTMENTS OF IMPERIAL COMPRESSION COUPLINGS, PRIMING CUPS, SHUT-OFF AND DRAIN COCKS

These new popular assortments of Imperial Compression Couplings, Priming Cups, Shut-Off and Drain Cocks for Garages and Dealers, with compartments and illustrated index make the fittings instantly available. They are a great convenience in selecting the proper part immediately. The selections as shown below were made up to meet the every-day requirements. They are the quickest and most effective means of connecting up tubing for Gasoline, Oil and Air lines on autos, trucks, tractors, motor boats, etc. Their adoption as standard by many leading manufacturers is due to ease of installation—no soldering, flaring or threading being necessary—and the fact that they make up absolutely tight. All Imperial Priming Cups, Shut-Off and Drain Cocks are individually ground to a perfect seat—an absolute assurance against leaking.

COMPRESSION COUPLING ASSORTMENTS



FIG. 5049

NO. 110-F

In box 17 x 9½ x 2 inches containing:

- | | |
|------------------------------|--------------------------------|
| 12—No. 60-F x ¼ inch Sleeves | 3—No. 66-F x ⅝ inch Bushings |
| 12—No. 60-F x ⅝ inch Sleeves | 8—No. 68-F x ¼ inch Connectors |
| 3—No. 62-F x ¼ inch Unions | 8—No. 68-F x ⅝ inch Connectors |
| 3—No. 62-F x ⅝ inch Unions | 8—No. 69-F x ¼ inch Elbows |
| 3—No. 64-F x ¼ inch Tees | 8—No. 69-F x ⅝ inch Elbows |
| 3—No. 64-F x ⅝ inch Tees | 3—No. 70-F x ¼ inch Elbows |
| 3—No. 65-F x ¼ inch Elbows | 3—No. 70-F x ⅝ inch Elbows |
| 3—No. 65-F x ⅝ inch Elbows | 3—No. 72-F x ¼ inch Tees |
| 3—No. 66-F x ¼ inch Bushings | 3—No. 72-F x ⅝ inch Tees |

No. 110-F Assortment. Price complete.....\$8.00

NO. 111-F

In box 17 x 9½ inches containing:

- | | | |
|------------------------------|--------------------------------|----------------------------|
| 12—No. 60-F x ¼ inch Sleeves | 3—No. 65-F x ¼ inch Elbows | 6—No. 69-F x ¼ inch Elbows |
| 12—No. 60-F x ⅝ inch Sleeves | 3—No. 65-F x ⅝ inch Elbows | 6—No. 69-F x ⅝ inch Elbows |
| 6—No. 62-F x ¼ inch Unions | 6—No. 66-F x ¼ inch Bushings | 6—No. 70-F x ¼ inch Elbows |
| 6—No. 62-F x ⅝ inch Unions | 6—No. 66-F x ⅝ inch Bushings | 6—No. 70-F x ⅝ inch Elbows |
| 6—No. 64-F x ¼ inch Tees | 8—No. 68-F x ¼ inch Connectors | 3—No. 72-F x ¼ inch Tees |
| 6—No. 64-F x ⅝ inch Tees | 6—No. 68-F x ⅝ inch Connectors | 3—No. 72-F x ⅝ inch Tees |

No. 111-F Assortment. Price complete.....\$10.00

PRIMING CUP, SHUT-OFF AND DRAIN COCK ASSORTMENT

NO. 112-F

In box 17 x 9½ x 2 inches containing:

- | |
|---|
| 12—No. 5-E Priming Cups, Short Shank, ⅛" I. P. T. |
| 12—No. 7-E Priming Cups, ⅛" Shank, ⅛" I. P. T. |
| 3—No. 27-EF Shut-Off Cocks, ¼" O. D. Tubing x ⅛" I. P. T. |
| 3—No. 29-EF Shut-Off Cocks, ⅝" O. D. Tubing x ⅛" I. P. T. |
| 3—No. 57-EF Shut-Off Cocks, ⅝" O. D. Tubing x ¼" I. P. T. |
| 3—No. 28-EF Shut-Off Cocks, ¼" O. D. Tubing |
| 3—No. 30-EF Shut-Off Cocks, ⅝" O. D. Tubing |
| 3—No. 58-EF Shut-Off Cocks, ⅝" O. D. Tubing |
| 3—No. 87-E Shut-Off Cocks, ⅛" I. P. T. |
| 6—No. 41-E Drain Cocks, ⅛" I. P. T. |
| 6—No. 42-E Drain Cocks, ¼" I. P. T. |

No. 112-F Assortment. Price complete.....\$30.66

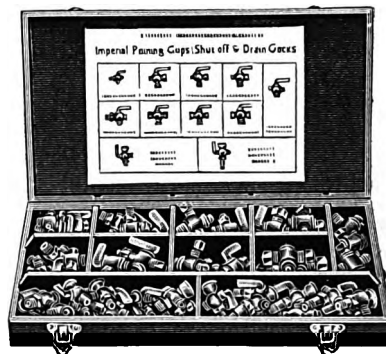


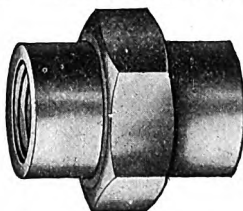
FIG. 5051

BRASS PIPE FITTINGS

IRON PIPE SIZE—FOR STEAM WORKING PRESSURE UP TO 125 POUNDS

ELBOWS AND RETURN BENDS**90 DEGREE ELBOW**
FIG. 2371**45 DEGREE ELBOW**
FIG. 2372**STREET ELBOW**
FIG. 2373

Size	inches	1/8	1/4	3/8	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3
90° Elbows, Rough	each	\$.12	\$.15	\$.20	\$.28	\$.40	\$.63	\$.90	\$1.20	\$2.00	\$3.50	\$6.00
90° Elbows, Polished	"	.30	.35	.45	.56	.75	1.10	1.55	2.00	3.00	5.50	9.00
45° Elbows, Rough	"	.16	.20	.25	.31	.40	.63	.90	1.20	2.00	3.50	6.00
45° Elbows, Polished	"	.38	.45	.55	.66	.85	1.23	1.70	2.20	3.25	6.00	9.75
Street Elbows, Rough	"	.25	.27	.33	.48	.63	.85	1.50	2.00	3.25	.....	.....
Street Elbows, Polished	"	.47	.52	.63	.83	1.08	1.45	2.30	3.00	4.50	.....	.....
Return Bends, open, rough .....	"	.....	.....	.....	.80	1.10	1.40	2.15	3.00	4.75	.....	.....

TEES, UNIONS, REDUCERS AND CAPS**TEE**
FIG. 2374**UNION**
FIG. 2375**REDUCER**
FIG. 2376**CAP**
FIG. 2377

Size	inches	1/8	1/4	3/8	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3
Tees Rough	each	\$.17	\$.21	\$.28	\$.40	\$.55	\$.85	\$1.25	\$1.70	\$2.80	\$5.00	\$8.50
Tees Polished	"	.42	.49	.63	.80	1.05	1.50	2.15	2.80	4.20	7.75	12.75
Crosses, Rough	"	.25	.30	.40	.55	.80	1.25	1.80	2.40	4.00	7.00	12.00
Crosses, Finished	"	.60	.70	.90	1.10	1.50	2.20	3.10	4.00	6.00	11.00	18.00
Unions Rough, Ground Joint .....	"	.....	.50	.65	.85	1.15	1.60	2.25	2.70	4.00	7.50	11.50
Unions Polished, Ground Joint	"	.50	.60	.85	1.05	1.40	1.90	2.75	3.25	5.00	9.00	14.00
Reducers, Rough .....	"	.....	.15	.20	.28	.40	.60	.90	1.10	1.75	2.75	4.00
Reducers, Polished .....	"	.....	.35	.45	.56	.75	1.05	1.55	1.90	2.75	4.75	7.00
Caps, Rough	"	.10	.13	.16	.20	.30	.42	.60	.80	1.25	2.50	3.50
Caps, Polished	"	.20	.25	.31	.40	.55	.77	1.10	1.50	2.25	4.00	5.50

COUPLINGS, BUSHINGS, LOCKNUTS AND PLUGS**COUPLING**
FIG. 2378**BUSHING**
FIG. 2379**LOCKNUT**
FIG. 2380**PLUG**
FIG. 2381

Size	inches	1/8	1/4	3/8	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3
Couplings, Rough	each	\$.10	\$.13	\$.17	\$.25	\$.37	\$.55	\$.80	\$1.00	\$1.60	\$2.50	\$3.50
Couplings, Polished	"	.24	.28	.36	.46	.63	.90	1.30	1.60	2.35	4.00	5.75
Bushings, Reducing, Rough .....	"	.....	.10	.12	.15	.22	.35	.50	.70	1.00	1.50	2.50
Bushings, Reducing, Polished .....	"	.....	.22	.27	.35	.47	.70	1.00	1.40	2.00	3.00	4.50
Locknuts, Rough	"	.10	.10	.12	.15	.20	.28	.40	.55	.80	1.75	2.75
Locknuts, Polished	"	.24	.25	.32	.40	.50	.65	.85	1.10	1.60	3.25	4.75
Plugs, Rough	"	.08	.10	.12	.15	.20	.30	.45	.60	.95	1.50	2.25
Plugs, Polished	"	.23	.30	.37	.43	.55	.75	1.00	1.30	1.95	3.00	4.25

Large end determines size of Bushing and Reducers.

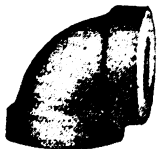
Bushings and Reducers, reducing more than two sizes, will be furnished at an advance of 25% over above prices.

BRASS PIPE FITTINGS**BRASS NIPPLES**
IRON PIPE SIZE**CLOSE—FIG. 2382****SHOULDER—FIG. 2383**

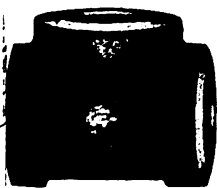
Size	Length Close*	Close	Length, Inches									
			1½	2	2½	3	3½	4	4½	5	5½	6
1/8	3/4	\$.11	\$.13	\$.15	\$.17	\$.19	\$.21	\$.23	\$.25	\$.27	\$.29	\$.31
1/4	1	.13	.16	.19	.22	.25	.28	.31	.34	.37	.40	.43
3/8	1 1/8	.15	.19	.23	.27	.31	.35	.39	.43	.47	.51	.55
1/2	1 1/4	.23	.25	.30	.35	.40	.45	.50	.55	.60	.65	.70
3/4	1 3/8	.28	...	.35	.42	.49	.56	.63	.70	.77	.84	.91
1	1 1/2	.37	...	.44	.53	.62	.71	.80	.89	.98	1.07	1.16
1 1/4	1 5/8	.60	...	...	.75	.88	1.01	1.14	1.27	1.40	1.53	1.66
1 1/2	1 3/4	.70	...	...	.90	1.05	1.20	1.35	1.50	1.65	1.80	1.95
2	2	1.00	...	...	1.20	1.40	1.60	1.80	2.00	2.20	2.40	2.60
2 1/2	2 1/2	1.70	...	...	...	2.00	2.30	2.60	2.90	3.20	3.50	3.80
3	2 5/8	2.50	...	...	...	2.90	3.30	3.70	4.10	4.50	4.90	5.30
3 1/2	2 3/4	4.00	...	...	...	...	...	5.40	6.00	6.60	7.20	7.80
4	2 7/8	4.75	...	...	...	...	...	6.15	6.85	7.55	8.25	8.95

*These lengths conform to the Manufacturers' Standard.

Finished Brass Nipples, longer than close, will be furnished at an advance of 25 per cent over above prices.

STANDARD CAST IRON FITTINGS**ELBOWS****STRAIGHT—FIG. 2384****REDUCING—FIG. 2385**
BLACK**45 DEGREE—FIG. 2386**

Size	inches	1/4	3/8	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3	3 1/2	4	4 1/2	5	6	7	8
Straight.....		\$.05	.05	.06	.08	10 1/2	.16	.20	.28	.50	.75	1.05	1.20	1.75	2.00	2.75	4.70	6.75
1 & L.....		\$.06	.06	.07	.09	.12	.18	.23	.32	.60	.85	...	...	...	...	...	...	...
Reducing.....		...	\$.06	.07	.09	.12	.18	.23	.32	.60	.85	1.20	1.40	2.00	2.30	3.15	5.40	7.75
45 Degree.....		...	\$.06	.07	.10	.12	.19	.24	.34	.60	.90	1.25	1.45	2.20	2.50	3.45	5.90	8.50

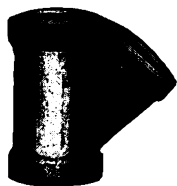
**STRAIGHT—FIG. 2387****TEES**
BLACK**REDUCING—FIG. 2388**

Size	inches	1/4	3/8	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3	3 1/2	4	4 1/2	5	6	7	8
Straight.....		\$.08	.08	.09	.12	.15	.23	.29	.41	.73	1.10	1.50	1.75	2.55	3.00	4.00	6.80	9.75
Reducing.....		\$.10	.14	.17	.27	.33	.47	.83	1.25	1.75	2.00	2.95	3.50	4.60	7.80	11.25

**STRAIGHT—FIG. 2389****CROSSES**
BLACK**REDUCING—FIG. 2390**

Size	inches	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3	3 1/2	4	4 1/2	5	6	7	8
Straight.....		\$.16	.22	.27	.42	.53	.75	1.30	2.00	2.70	3.15	4.60	5.50	7.25	12.25	17.50
Reducing.....		\$.18	.25	.30	.46	.60	.83	1.45	2.20	3.00	3.50	5.10	6.00	8.00	13.50	19.25

STANDARD CAST IRON FITTINGS

Y BRANCHES
BLACK

STRAIGHT—FIG. 2391

Size	inches	1/4	3/8	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3	3 1/2	4	4 1/2	5	6	7	8
Price, each				\$.20	.28	.34	.54	.66	.94	1.66	2.50	3.50	4.00	5.90	7.00	9.20	15.60	22.50

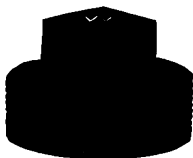
REDUCERS AND CAPS
BLACK

REDUCER—FIG. 2392



CAP—FIG. 2393

Size	inches	3/4	1	1 1/4	1 1/2	2	2 1/2	3	3 1/2	4	4 1/2	5	6	7	8
Reducer		\$.10	.16	.22	.28	.43	.60	.80	1.00	1.35	1.85	2.00	2.70	5.35	6.75
Cap		\$.05	.08	.14	.20	.26	.40	.54	.75	.87	1.05	1.20	1.55	2.50	2.85

PLUGS
BLACK

SQUARE HEAD—FIG. 2394



COUNTERSUNK—FIG. 2395

Size	inches	1/8	1/4	3/8	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3	3 1/2	4	4 1/2	5	6	7	8
Square Head		\$0.02	.02	.02	.02	.03	.04	.05	.07	.10	.18	.25	.38	.42	.65	.88	1.20	1.85	2.75
Solid		\$.04	.04	.04	.04	.06	.08	.09	.11	.15	.27	.38	.57	.63	1.00	1.35	1.80	2.80	4.15
Countersunk					.04	.06	.08	.09	.11	.15	.30	.40	.92	1.10		2.00	3.50		

LOCKNUTS AND BUSHINGS
BLACK

BUSHING—FIG. 2396



LOCKNUT—FIG. 2397

Size	inches	3/8	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3	3 1/2	4	4 1/2	5	6	7	8
*Bushings		\$.04	.04	.05	.06	.07	.09	.14	.21	.30	.40	.50	.75	.93	1.25	1.87	2.75
Lock Nuts									.27	.34	.47	.64	.85	.90	1.30	1.70	2.35

*Reducing two or more sizes up to 2 1/2 inch inclusive reducing one or more sizes 3 inch and up.



FIG. 2398

STANDARD WROUGHT IRON COUPLINGS

Size	inches	1/8	1/4	3/8	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3	3 1/2	4	4 1/2	5	6	7	8
Plain, Price, each		\$.05	.05	.06	.07	.10	.13	.17	.21	.28	.40	.60	.80	1.00	1.50	1.65	2.40	3.25	4.25

WROUGHT IRON NIPPLES

CLOSE
FIG. 2408SHOULDER
FIG. 2409

BLACK RIGHT-HAND NIPPLES

Length, Inches						Price, each		Price, Extra Long Nipples, Each										
Close or Short	Short	Long				Size, In.	Close or Short	Long	Length, inches									
		4	5	6	7				8	9	10	11	12					
¾	1½	2	2½	3	3½	1/8	\$.04	\$.06	\$.07	\$.08	\$.10	\$.12	\$.14	\$.15	\$.17	\$.18	\$.19	
1	1½	2	2½	3	3½	1/4	.04	.06	.07	.08	.10	.12	.14	.15	.17	.18	.19	
1 1/8	1½	2	2½	3	3½	3/8	.04	.06	.07	.08	.10	.12	.14	.15	.17	.18	.19	
1 1/4	1½	2	2½	3	3½	1/2	.05	.07	.08	.10	.12	.14	.16	.18	.20	.22	.23	
1 1/2	2	2½	3	3½	4	3/4	.06	.09	.....	.11	.13	.17	.18	.20	.22	.24	.26
1 3/4	2	2½	3	3½	4	1	.08	.13	.....	.15	.18	.23	.25	.28	.31	.34	.36
2	2½	3	3½	4	4½	1 1/4	.11	.17	.....	.20	.24	.29	.33	.36	.40	.44	.47
2 1/8	2½	3	3½	4	4½	1 1/2	.13	.20	.....	.25	.29	.36	.40	.45	.50	.54	.59
2 1/4	2½	3	3½	4	4½	2	.18	.27	.....	.32	.38	.50	.54	.59	.65	.72	.77
2 1/2	3	3½	4	4½	5	2½	.39	.59	.....	.....	.68	.90	.97	1.06	1.17	1.26	1.35
2 3/4	3	3½	4	4½	5	3	.48	.72	.....	.....	.85	1.08	1.20	1.33	1.45	1.58	1.70
3	4	4½	5	5½	6	3½	.75	1.05	.....	.....	.....	1.30	1.45	1.60	1.75	1.90	2.05
3 1/8	4	4½	5	5½	6	4	.85	1.20	.....	.....	.....	1.52	1.69	1.87	2.05	2.22	2.40
3 1/4	4	4½	5	5½	6	4½	1.25	1.70	.....	.....	.....	2.25	2.50	2.75	2.95	3.17	3.40
3 1/2	4½	5	5½	6	6½	5	1.55	2.45	.....	.....	.....	2.58	2.83	3.10	3.35	3.60	3.85
3 3/4	4½	5	5½	6	6½	6	1.85	2.90	.....	.....	.....	3.05	3.35	3.70	4.00	4.30	4.65
4	5	.....	.....	.....	.....	7	3.20	.....	.....	.....	3.60	4.05	4.45	4.90	5.30	5.75	6.15
4 1/8	5	.....	.....	.....	.....	8	3.55	.....	.....	.....	4.05	4.55	5.05	5.50	6.00	6.50	7.00
4 1/4	5	.....	.....	.....	.....	9	5.25	.....	.....	.....	.....	.....	6.50	7.10	7.75	8.40	9.00
4 1/2	5	.....	.....	.....	.....	10	6.75	.....	.....	.....	.....	.....	8.25	8.90	9.70	10.40	11.15
4 3/4	5	.....	.....	.....	.....	12	8.00	.....	.....	.....	.....	.....	10.00	10.80	11.75	12.70	13.65

Nipples made to order from extra heavy pipe at double above list. Nipples larger than 12 inches made to order and charged as cut pipe. Threads extra.

GALVANIZED RIGHT-HAND NIPPLES

Length, Inches						Size, In.	Price, Each		Price, Extra Long Nipples, Each									
Close or Short	Long						Close or Short	Long	Length, Inches									
	4	5	6	7	8				9	10	11	12						
¾	1½	2	2½	3	3½	1/8	\$.06	\$.11	\$.12	\$.15	\$.17	\$.21	\$.24	\$.26	\$.29	\$.31	\$.34	
1	1½	2	2½	3	3½	¼	.06	.11	.12	.15	.17	.21	.24	.26	.29	.31	.34	
1 1/8	1½	2	2½	3	3½	3/8	.06	.11	.12	.15	.17	.21	.24	.26	.29	.31	.34	
1 1/4	1½	2	2½	3	3½	½	.06	.11	.13	.16	.18	.23	.26	.28	.31	.33	.36	
1 1/2	2	2½	3	3½	4	¾	.08	.14	.....	.18	.21	.26	.29	.32	.35	.38	.41
1 3/4	2	2½	3	3½	4	1	.11	.19	.....	.24	.28	.34	.38	.42	.47	.51	.55
2	2½	3	3½	4	4½	1 1/4	.17	.29	.....	.32	.38	.45	.51	.57	.63	.69	.75
2 1/8	2½	3	3½	4	4½	1 1/2	.21	.35	.....	.39	.46	.55	.63	.70	.77	.84	.91
2 1/4	2½	3	3½	4	4½	2	.27	.47	.....	.52	.61	.74	.83	.93	1.03	1.13	1.23
2 1/2	3	3½	4	4½	5	2½	.56	.86	.....	1.00	1.26	1.41	1.56	1.71	1.86	2.01	2.16
2 3/4	3	3½	4	4½	5	3	.70	1.10	.....	1.30	1.60	1.80	2.00	2.20	2.40	2.60	2.80
3	4	4½	5	5½	6	3½	1.20	1.70	.....	2.10	2.35	2.60	2.85	3.15	3.40	3.60	3.80
3 1/8	4	4½	5	5½	6	4	1.35	1.87	.....	2.30	2.60	2.90	3.20	3.50	3.80	4.10	4.40
3 1/4	4	4½	5	5½	6	4½	1.85	2.60	.....	3.30	3.65	4.05	4.45	4.85	5.25	5.65	6.05
3 1/2	4½	5	5½	6	6½	5	2.30	3.15	.....	3.75	4.20	4.60	5.00	5.40	5.85	6.25	6.65
3 3/4	4½	5	5½	6	6½	6	2.80	4.25	.....	4.50	5.00	5.55	6.05	6.60	7.15	7.65	8.15
4	5	5½	6	6½	7	7	4.25	5.00	.....	4.95	5.65	6.35	7.05	7.75	8.45	9.20	9.90
4 1/8	5	5½	6	6½	8	8	5.00	5.00	.....	5.80	6.65	7.50	8.35	9.25	10.10	10.95	11.80

Nipples made to order from galvanized extra heavy pipe at double above list.

MALLEABLE IRON FITTINGS

TEES



FIG. 2399
BANDED



FIG. 2401
DROP FEMALE

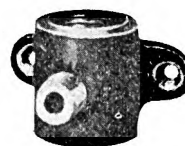


FIG. 2402
DROP M. & F.



FIG. 2403
FOUR WAY

BANDED

Size.....inches	1/8	1/4	3/8	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3	3 1/2	4	4 1/2	5	6
Black Banded Tee, Straight .each	\$.18	.14	.22	.25	.23	.35	.60	.80	1.35	2.40	3.70	4.80	7.50	10.00	16.00	23.00
Black Banded Tee, Reducing .each	\$ . . .	.27	.26	.33	.48	.45	.77	1.00	1.75	3.00	4.60	6.00	9.30	12.00	19.00	28.00
Galv. Banded Tee, Straight .each	\$.25	.20	.32	.37	.38	.58	1.00	1.35	2.35	4.00	6.10	8.00	12.50	17.00	27.00	38.00
Galv. Banded Tee, Reducing .each	\$ . . .	.40	.40	.48	.72	.74	1.30	1.70	2.90	5.00	7.60	10.00	15.50	20.00	32.00	46.00

DROP TEES—FEMALE

Size.....inches	1/4	3/8	1/2	3/4	1
Blk. Female Drop Tee, Str. .each	\$.15	.22	.34	.55	.75
Blk. Female Drop Tee, Red. .each	\$ . . .	.26	.40	.66	.90
Gal. Female Drop Tee, Str. .each	\$.22	.32	.50	.80	1.15
Gal. Female Drop Tee, Red. .each	\$ . . .	.40	.60	1.00	1.35

DROP TEES—MALE AND FEMALE

Size.....inches	3/8	1/2	3/4	1
Black Male & Fem. Drop Tee, Str. .each	\$.22	.34	.55	.75
Blk. Male & Fem. Drop Tee, Red. .each	\$.26	.40	.66	.90
Gal. M. and F. Drop Tee, Str. .each	\$.32	.50	.80	1.15
Gal. M. and F. Drop Tee, Red. .each	\$.40	.60	1.00	1.35

FOUR WAY TEES

Size.....inches	3/8	1/2	3/4	1	1 1/4	1 1/2	2
Blk. Four Way Teeeach	\$.23	.36	.47	.85	1.40	2.00	3.20
Gal. Four Way Teeeach	\$.34	.53	.70	1.25	2.00	2.80	4.70

CROSSES



BANDED CROSS
FIG. 2406



Y BRANCH
FIG. 2407

Size.....inches	1/8	1/4	3/8	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3	3 1/2	4	5	6
Black Banded, Straighteach	\$.29	.15	.28	.42	.60	.95	1.00	1.20	2.00	3.60	6.00	6.60	11.50	17.50	25.00
Black Banded, Reducingeach	\$ . . .	. . .	. . .	. . .	. . .	1.15	1.20	1.40	2.50	4.30	7.30	8.00	14.00	. . .	. . .
Galv. Banded, Straighteach	\$ . . .	. . .	.40	.62	.90	1.40	1.65	2.20	3.50	6.00	10.00	11.00	19.00	29.00	42.00
Galv. Banded, Reducingeach	\$ . . .	. . .	. . .	. . .	. . .	1.70	2.00	2.40	4.00	7.20	12.00	13.00	23.00	. . .	. . .

Y BRANCHES

Size.....inches	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3	3 1/2	4
45° Black Banded, Straight or Reducingeach	\$.35	.75	.80	1.35	1.85	2.75	6.50	12.00	14.00	18.00
45° Galv. Banded, Straight or Reducingeach	\$.52	1.10	1.20	2.00	2.75	4.30	9.50	18.00	21.00	27.00
Dble. 45° or 60° Banded, Black, Straight or Reducingeach	\$ . . .	. . .	. . .	2.15	3.20	4.70	8.60	. . .	. . .	. . .
Dble. 45° or 60° Banded, Galv., Straight or Reducingeach	\$ . . .	. . .	. . .	3.15	6.00	7.00	13.00	. . .	. . .	. . .

Special Note—The list on Malleable Fittings, 3/8 inch or 1/2 inch, reducing to 1/8 inch, will be double the Reducing list. 1 inch and larger, reducing to 1/2 inch or smaller, add 50 per cent to the Reducing list.

MALLEABLE IRON FITTINGS

BANDED ELBOWS



BANDED ELBOW—FIG. 2411



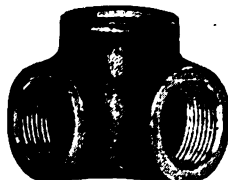
45° ELBOW, BANDED—FIG. 2412

Size.....inches	1/8	1/4	3/8	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3	3 1/2	4	4 1/2	5	6
Black, Banded, Straight.....	\$0.13	.11	.16	.19	.18	.30	.48	.60	1.00	2.00	3.00	4.00	6.50	9.00	15.00	20.00
Black, Banded, Reducing.....	\$...	.22	.20	.24	.36	.40	.60	.70	1.30	2.50	3.75	4.80	8.00	11.00	18.00	24.00
Black, Banded, R. and L.....	\$...	.34	.38	.30	.48	.80	.72	1.00	1.80	.....	.....	.....	.....	.....	.....	.....
Galvanized, Banded, Straight..	\$0.18	.16	.24	.28	.28	.50	.78	1.00	1.70	3.50	5.00	6.65	10.75	15.00	25.00	33.00
Galvanized, Banded, Reducing..	\$...	.30	.29	.36	.54	.64	1.00	1.20	2.20	4.40	6.20	8.00	13.50	18.50	30.00	40.00
Galvanized, Banded, R. and L..	\$...	.45	.55	.47	.70	1.20	1.20	1.65	3.00	.....	.....	.....	.....	.....	.....	.....
15° Black, Banded.....	\$...	.08	.10	.17	.28	.42	.80	.90	1.30	2.10	2.90	4.00	5.80	6.30	7.80	12.00
15° Galvanized, Banded.....	\$...	.12	.17	.25	.42	.64	1.20	1.30	2.00	3.50	4.80	6.70	9.70	10.50	13.00	19.00
10° Black, Banded.....	\$...	.....	.....	.....	.....	.44	.80	.90	1.50	.....	.....	.....	.....	.....	.....	.....
10° Galvanized, Banded.....	\$...	.....	.....	.....	.....	.64	1.20	1.30	2.25	.....	.....	.....	.....	.....	.....	.....

STREET AND SIDE OUTLET ELBOWS



STREET ELBOW—FIG. 2413



SIDE OUTLET ELBOW—FIG. 2414



FEMALE DROP ELBOW—FIG. 2415

Size.....inches	1/8	1/4	3/8	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3	4
0° Street Elbow, Black, Straight.....	\$0.16	.10	.14	.22	.38	.38	.57	.68	1.30	2.50	4.30	10.00
0° Street Elbow, Black, Reducing.....	\$...	.....	.....	.....	.44	.70	.70	.85	1.60	3.00	5.20	12.00
0° Street Elbow, Galvanized, Straight.....	\$0.27	.15	.21	.32	.58	.64	.95	1.15	2.20	4.20	7.20	17.00
0° Street Elbow, Galvanized, Reducing.....	\$...	.....	.....	.....	.64	1.02	1.15	1.40	2.70	5.00	8.60	20.00
Black Side Outlet Elbows, Straight.....	\$...	.....	.....	.17	.27	.48	.77	1.15	1.45	2.50	.....	.....
Black Side Outlet Elbows, Reducing.....	\$...	.....	.....	.20	.32	.58	.92	1.38	.....	.....	.....	.....
Galvanized Side Outlet Ells, Straight.....	\$...	.....	.....	.27	.39	.71	1.15	1.70	2.10	3.70	.....	.....
Galvanized Side Outlet Ells, Reducing.....	\$...	.....	.....	.32	.47	.85	1.35	2.00	.....	.....	.....	.....

DROP ELBOWS

Size.....inches	1/4	3/8	1/2	3/4	1	Size.....inches	1/4	3/8	1/2
Black Female Drop Ells, Straight....	\$0.15	.19	.25	.46	.80	Galvanized M. & F. Drop Ell, Straight....	\$0.22	.31	.52
Black Female drop Ells, Reducing....	\$...	.23	.30	.55	.96	Galvanized M. & F. Drop Ell, Reducing....	\$....	.37	.62
Gal. Female Drop Ells, Straight....	\$0.22	.28	.36	.67	1.20	Black Long M. & F. Drop Ells, Str.....	\$0.20	.43	.55
Gal. Female Drop Ells, Reducing....	\$...	.34	.44	.81	1.40	Black Long M. & F. Drop Ells, Red.....	\$....	.52	.66
Black M. & F. Drop Ells, Straight....	\$0.15	.21	.35	.....	.....	Galv. Long M. & F. Drop Ells, Straight....	\$0.29	.63	.81
Black M. & F. Drop Ells, Reducing..	\$...	.25	.42	.....	.....	Galvanized Long M. & F. Drop Ells, Red..	\$....	.76	1.00

Special Note—The list on Malleable Fittings, 3/8 inch or 1/2 inch, reducing to 1/8 inch, will be double the Reducing list. 1 inch and larger, reducing to 1/2 inch or smaller, add 50 per cent to the Reducing list.

MALLEABLE IRON FITTINGS

SERVICE TEES



FIG- 2416

Size.....inches	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{3}{4}$	1	$1\frac{1}{4}$	$1\frac{1}{2}$	2	$2\frac{1}{2}$	3	4
Black Service Tee, Straight.....each	\$.18	.30	.48	.44	.72	.95	1.65	3.15	4.70	9.60
Black Service Tee, Reducing.....each	\$.18	.30	.60	.88	.90	1.20	2.10	3.75	5.60	11.50
Galv. Service Tee, Straight.....each	\$.26	.45	.71	.72	1.20	1.60	2.75	5.20	7.80	16.00
Galv. Service Tee, Reducing.....each	\$.26	.45	.88	1.30	1.50	1.95	3.40	6.25	9.40	19.00

RETURN BENDS

CLOSE
FIG. 2417MEDIUM
FIG. 2418OPEN
FIG. 2419

CLOSE PATTERN

Size.....inches	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{3}{4}$	1	$1\frac{1}{4}$	$1\frac{1}{2}$	2
Black R. H.....each	\$.36	.44	.50	.95	1.25	1.55	2.25
Black R. and L.....each	\$.72	.90	.50	.95	2.10	2.55	3.75
Galvanized R. H.....each	\$.55	.70	.75	1.40	2.10	2.50	3.95
Galvanized R. and L.....each	\$.96	1.25	.75	1.40	3.10	3.75	5.50
Center to Center.....inches	.....	1	$1\frac{1}{4}$	$1\frac{1}{2}$	$1\frac{3}{4}$	$2\frac{1}{8}$	$2\frac{3}{8}$

MEDIUM PATTERN

Size.....inches	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{3}{4}$	1	$1\frac{1}{4}$	$1\frac{1}{2}$	2
Black R. H.....each	\$.38	.50	.55	1.05	1.40	1.70	2.50
Black R. and L.....each	\$.80	1.00	.55	1.05	2.30	2.75	4.25
Galvanized R. H.....each	\$.57	.72	.80	1.50	2.30	2.80	4.25
Galvanized R. & L.....each	\$1.05	1.30	.80	1.50	3.35	4.10	6.25
Center to Center.....inches	.....	$1\frac{1}{4}$	$1\frac{1}{2}$	$1\frac{3}{8}$	$2\frac{1}{4}$	$2\frac{1}{2}$	3

OPEN PATTERN

Size.....inches	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{3}{4}$	1	$1\frac{1}{4}$	$1\frac{1}{2}$	2	$2\frac{1}{2}$	3
Black R. H.....each	\$.42	.54	.67	1.15	1.50	2.65	3.40	5.00	7.50
Black R. and L.....each	\$.85	1.10	.70	1.15	2.50	4.40	5.65	8.50	12.50
Galv. R. H.....each	\$.62	.80	1.00	1.65	2.50	4.35	5.65	8.50	12.50
Galv. R. and L.....each	\$1.10	1.40	1.00	1.65	3.70	6.50	8.50	12.50	18.00
Center to Center.....inches	$1\frac{1}{2}$	$1\frac{1}{2}$	2	$2\frac{1}{2}$	3	$3\frac{1}{2}$	4	$4\frac{1}{2}$	5

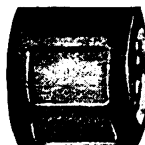
MALLEABLE IRON FITTINGS REDUCERS, COUPLINGS AND CAPS



REDUCER
FIG. 2420



R. H. COUPLING
FIG. 2421



R. & L. COUPLING
FIG. 2422



CAP
FIG. 2423

Size.....inches	1/8	1/4	3/8	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3	3 1/2	4	5	6
Reducers, Black.....each	\$.14	.12	.18	.25	.40	.40	.52	.90	1.60	2.40	3.20	4.00	.....	.....
Reducers, Galv....."	\$.20	.18	.27	.38	.60	.70	.86	1.45	2.60	4.00	5.40	6.75	.....	.....
R. H. Couplings, Blk....."	\$.14	.08	.13	.18	.30	.30	.43	.60	.95	1.75	2.80	.....	.....	.....
R. H. Couplings, Galv....."	\$.20	.13	.20	.27	.46	.52	.70	1.00	1.55	3.00	3.70	.....	.....	.....
R. & L. Couplings, Blk....."	\$.19	.11	.19	.25	.37	.36	.55	.75	1.25	2.20	2.80	.....	.....	.....
R. & L. Couplings, Galv....."	\$.27	.17	.30	.37	.55	.60	.95	1.25	2.00	3.60	4.60	.....	.....	.....
Caps, Blk....."	\$.10	.07	.10	.12	.20	.26	.38	.45	.75	1.20	1.80	2.20	3.00	4.80
Caps, Galv....."	\$.15	.11	.15	.18	.28	.38	.65	.75	1.20	2.00	3.00	3.50	5.00	8.00

Reducers, 1 1/4-in. and larger reducing to 1/2-in. or smaller, 50% added to reducing list.

BUSHINGS, LOCKNUTS, WASTE NUTS AND EXTENSION PIECES



BUSHING
FIG. 2424



FACED BUSHING
FIG. 2425



LOCKNUT
FIG. 2426



WASTE NUT
FIG. 2427



EXTENSION PIECE
FIG. 2428

Size.....inches	1/8	1/4	3/8	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3	3 1/2	4	4 1/2	5	6
Bushings, Blk.....each	\$.04	.04	.04	.05	.06	.07	.09	.14	.21	.30	.40	.50	.75	.93	1.25
" Galv....."	\$.08	.08	.10	.12	.14	.18	.28	.42	.60	.80	1.00	1.50	1.86	2.50	.....
Faced Bushings, Blk....."	\$.08	.08	.10	.12	.14	.18	.28	.42	.60	.80	1.00	1.50	1.86	2.50	.....
Locknuts, Blk....."	\$.07	.05	.06	.10	.20	.38	.38	.54	.90	1.20	1.80	2.20	.....	.....	.....
" Galv....."	\$.12	.08	.10	.15	.30	.42	.57	.89	1.45	1.90	3.20	3.60	.....	.....	.....
Waste " Blk....."07	.11	.13	.18	.20	.38	.85	1.20	.....	.....	.....	.....	.....	.....
" Galv....."12	.17	.20	.27	.30	.57	1.25	1.75	.....	.....	.....	.....	.....	.....
Extension Pieces, Blk....."10	.12	.24	.35	.55	.85	1.20	1.50	.....	.....	.....	.....	.....	.....
" Galv....."16	.18	.35	.50	.85	1.25	1.75	2.25	.....	.....	.....	.....	.....	.....

STANDARD UNIONS



FIG. 2429

FOR STEAM WORKING PRESSURES UP TO 150 POUNDS

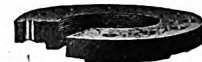
Size.....inches	1/8	1/4	3/8	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3	3 1/2	4
Unions, Black.....each	\$.18	.18	.20	.22	.27	.33	.46	.58	.75	1.55	2.10	3.65	4.35
" Galv....."	\$.27	.27	.30	.33	.40	.50	.70	.90	1.15	2.35	3.15	5.50	6.50

STANDARD COMPANION FLANGES

CAST IRON, FERROSTEEL, CAST STEEL, FORGED STEEL AND MALLEABLE IRON
FOR STEAM WORKING PRESSURES UP TO 125 POUNDS



BACK VIEW, SHOWING HUB
FIG. 2430



SMOOTH FACE
FIG. 2431

Size Inches	Cast Iron		Ferroteel		Cast Steel		Forged Steel	
	Faced Each	Faced and Drilled Each	Faced Each	Faced and Drilled Each	Faced Each	*Faced, Drilled and Spot Faced Each	Faced Each	Faced and Drilled Each
1 x 4	\$.55	\$.80	\$.70	\$ 1.00	\$ 5.00	\$ 6.50	.....	.....
1 1/4 x 4 1/2	.60	.85	.75	1.05	5.40	7.00	.....	.....
1 1/2 x 5	.65	.90	.80	1.10	5.90	7.50	.....	.....
2 x 6	.75	1.00	.95	1.25	6.90	8.50	\$10.40	\$11.00
2 1/2 x 7	.85	1.10	1.05	1.35	7.30	9.50	11.80	13.00
3 x 7 1/2	.95	1.25	1.20	1.55	8.70	11.00	13.70	15.00
3 1/2 x 8 1/2	1.20	1.55	1.50	1.95	12.10	14.50	17.60	19.00
4 x 9	1.35	1.80	1.70	2.25	14.80	18.50	18.30	20.00
4 1/2 x 9 1/4	1.45	1.90	1.80	2.35	15.80	19.50	20.30	22.00
5 x 10	1.60	2.05	2.00	2.55	16.80	20.50	22.30	24.00
6 x 11	2.00	2.50	2.50	3.10	20.40	24.00	25.40	27.00
7 x 12 1/2	2.65	3.25	3.30	4.05	24.70	29.50	27.20	32.00
8 x 13 1/2	3.10	3.80	3.90	4.75	27.00	32.00	32.00	35.00
9 x 15	3.85	4.65	4.80	5.80	29.50	35.50	37.00	40.00
10 x 16	4.50	5.50	5.65	6.85	34.50	40.50	45.00	48.00
12 x 19	6.50	7.65	8.15	9.55	46.00	53.00	56.00	60.00
14 x 21	9.00	10.35	11.25	13.00	55.50	63.00	75.50	80.00
15 x 21	11.50	13.20	14.50	16.50	64.00	74.00	.....	.....
15 x 22 1/4	11.50	13.20	14.50	16.50	64.00	74.00	.....	.....
16 x 23 1/2	13.50	15.30	17.00	19.00	78.00	89.00	.....	.....

For malleable iron flanges use double the list prices of cast iron flanges.

*Cast Steel Flanges, when ordered faced and drilled, will always be furnished with bolt holes spot faced at the prices given above.
Furnished smooth faced and not drilled, unless otherwise specified.

Standard Cast Steel Shrink Flanges made to order. Prices on application.

CAST IRON FLANGE UNIONS

STANDARD



FIG. 2432

EXTRA HEAVY

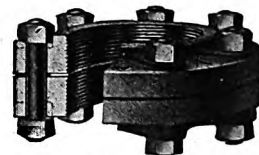


FIG. 2433

FOR STEAM WORKING PRESSURES UP TO 125 POUNDS

FACED GASKET EXTRA

Size.....inches	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2
Price, Black ....Ea.	\$.40	.46	.52	.64	.78	1.00	1.25
Price, Galv.....Ea.	\$.80	.92	1.04	1.28	1.56	2.00	2.50
Dia. of flanges...In.	2 3/4	3 3/8	3 5/8	4 1/8	4 1/2	5 1/8	5 7/8
Number of Bolts....	3	3	3	4	4	4	4
Size.....In.	3	3 1/2	4	4 1/2	5	6	7
Price, Black ....Ea.	\$1.50	1.80	2.10	2.70	3.15	3.95	5.50
Price, Galv.....Ea.	\$3.00	3.60	4.20	5.40	6.30	7.90	11.00
Dia. of flanges...In.	6 5/8	7 1/4	7 3/4	8 3/8	9 1/8	10 3/8	11 3/8
Number of Bolts....	4	4	5	5	5	6	7
Size.....In.	8	9	10	12	14	15	16
Price, Black ....Ea.	\$ 7.00	10.00	11.50	16.00	28.00	35.00	60.00
Price, Galv.....Ea.	\$14.00	20.00	23.00	32.00	56.00	70.00	.....
Dia. of flanges...In.	12 3/4	13 3/8	15 1/2	17 3/8	20 5/8	20 5/8	23
Number of Bolts...	8	9	10	12	14	14	16

Sizes 14 inch and larger are to be used with O. D. pipe of the same sizes.

FOR STEAM WORKING PRESSURES UP TO 250 POUNDS

FACED GASKET EXTRA

Size.....Inches	1/2	3/4	1	1 1/4	1 1/2	2
Price.....Ea.	\$.60	.70	.80	1.00	1.15	1.50
Diam. Flanges....In.	3	3 1/4	3 3/8	4 1/8	4 5/8	5 3/8
Number of Bolts....	3	4	4	4	4	5
Size.....In.	2 1/2	3	3 1/2	4	4 1/2	5
Price.....Ea.	\$1.90	2.25	2.70	3.15	4.00	4.75
Diam. Flanges....In.	6	6 3/4	7 1/2	8	8 3/4	9 3/8
Number of Bolts....	5	6	6	7	8	8
Size.....In.	6	7	8	9	10	12
Price.....Ea.	\$6.00	8.25	10.50	15.00	17.25	24.00
Diam. Flanges....In.	10 7/8	12	13 3/4	14 3/8	15 3/4	18
Number of Bolts....	9	10	10	12	12	14

STANDARD WROUGHT PIPE

FOR STEAM, GAS AND WATER



FIG. 2435

FULL STANDARD WEIGHT—BLACK AND GALVANIZED

All Weights and Dimensions are Nominal

Size, inches	List Price per foot	Diameters, inches		Thickness, inches	Weight per foot, lbs.		Threads per inch
		External	Internal		Plain ends	Threads and couplings	
1/8405	.269	.068	.244	.245	27
1/4540	.364	.088	.424	.425	18
3/8675	.493	.091	.567	.568	18
1/2840	.622	.109	.850	.852	14
3/4	1.050	.824	.113	1.130	1.134	14
1	1.315	1.049	.133	1.678	1.684	11 1/2
1 1/4	1.660	1.380	.140	2.272	2.281	11 1/2
1 1/2	1.900	1.610	.145	2.717	2.731	11 1/2
2	2.375	2.067	.154	3.652	3.678	11 1/2
2 1/2	2.875	2.469	.203	5.793	5.819	8
3	3.500	3.068	.216	7.575	7.616	8
3 1/2	4.000	3.548	.226	9.109	9.202	8
4	4.500	4.026	.237	10.790	10.889	8
4 1/2	5.000	4.506	.247	12.538	12.642	8
5	5.563	5.047	.258	14.617	14.810	8
6	6.625	6.065	.280	18.974	19.185	8
7	7.625	7.023	.301	23.544	23.769	8
8	8.625	8.071	.277	24.696	25.000	8
8	8.625	7.981	.322	28.554	28.809	8

The permissible variation in weight is 5% above and 5% below.

Furnished with threads and couplings and in random lengths unless otherwise ordered.

For cut lengths, an extra charge will be made above random lengths.

For pipe smoothed on the inside, known as reamed and drifted, an extra charge will be made above standard pipe.

For galvanized, or coated pipe, an extra charge will be made above black.

EXTRA STRONG PIPE—BLACK AND GALVANIZED

All Weights and Dimensions are Nominal

Size, inches	List Price per foot	Diameters, inches		Thickness, inches	Weight per foot, lbs. plain ends
		External	Internal		
1/8405	.215	.095	.314
1/4540	.302	.119	.535
3/8675	.423	.126	.738
1/2840	.546	.147	1.087
3/4	1.050	.742	.154	1.473
1	1.315	.957	.179	2.171
1 1/4	1.660	1.278	.191	2.996
1 1/2	1.900	1.500	.200	3.631
2	2.375	1.939	.218	5.022
2 1/2	2.875	2.323	.276	7.661
3	3.500	2.900	.300	10.252
3 1/2	4.000	3.364	.318	12.505
4	4.500	3.826	.337	14.983
4 1/2	5.000	4.290	.355	17.611
5	5.563	4.813	.375	20.778
6	6.625	5.761	.432	28.573
7	7.625	6.625	.500	38.048
8	8.625	7.625	.500	43.388

The permissible variation in weight is 5% above and 5% below.

CAST IRON PIPE**STANDARD THICKNESS AND WEIGHTS OF CAST IRON PIPE****CLASSES A, B, C, D**

Nom- inal inside diam- eter, ins.	Class A 100-foot head 43 pounds pressure			Class B 200-foot head 86 pounds pressure			Class C 300-foot head 130 pounds pressure			Class D 400-foot head 173 pounds pressure			Nom- inal inside diam- eter, inches
	Thick- ness, inches	Weight per		Thick- ness, inches	Weight per		Thick- ness, inches	Weight per		Thick- ness, inches	Weight per		
		Foot	Length		Foot	Length		Foot	Length		Foot	Length	
4	.42	20.0	240	.45	21.7	260	.48	23.3	280	.52	25.0	300	4
6	.44	30.8	370	.48	33.3	400	.51	35.8	430	.55	38.3	460	6
8	.46	42.9	515	.51	47.5	570	.56	52.1	625	.60	55.8	670	8
10	.50	57.1	685	.57	63.8	765	.62	70.8	850	.68	76.7	920	10
12	.54	72.5	870	.62	82.1	985	.68	91.7	1100	.75	100.0	1200	12
14	.57	89.6	1075	.66	102.5	1230	.74	116.7	1400	.82	129.2	1550	14
16	.60	108.3	1300	.70	125.0	1500	.80	143.8	1725	.89	158.3	1900	16
18	.64	129.2	1550	.75	150.0	1800	.87	175.0	2100	.96	191.7	2300	18
20	.67	150.0	1800	.80	175.0	2100	.92	208.3	2500	1.03	229.2	2750	20
24	.76	204.2	2450	.89	233.3	2800	1.04	279.2	3350	1.16	306.7	3680	24
30	.88	291.7	3500	1.03	333.3	4000	1.20	400.0	4800	1.37	450.0	5400	30

The above weights are per length to lay 12 ft., including standard sockets; proportionate allowance to be made for any variation.

LAP WELDED CASING

FOR WATER, WELL AND IRRIGATION PURPOSES



SCREW AND SOCKET JOINT
FIG. 2438



INSERTED JOINT
FIG. 2439

ADOPTED JANUARY 1, 1913

ALL WEIGHTS AND DIMENSIONS ARE NOMINAL

Size Inches	Price per Foot	Diameter, inches		Thickness Inches	Weight per Foot Plain Ends Pounds	Number of Threads per Inch
		External	Internal			
2	.33	2.250	2.050	.100	2.296	14
2 1/4	.33	2.500	2.284	.108	2.759	14
2 1/2	.33	2.750	2.524	.113	3.182	14
2 3/4	.40	3.	2.768	.116	3.572	14
3	.41	3.250	3.010	.120	4.011	14
3 1/4	.46	3.500	3.250	.125	4.505	14
3 1/2	.51	3.750	3.492	.129	4.988	14
3 3/4	.56 1/2	4.	3.732	.134	5.532	14
4	.62	4.250	3.974	.138	6.060	14
4 1/4	.68 1/2	4.500	4.216	.142	6.609	14
4 1/2	.74	4.750	4.460	.145	7.131	14
4 3/4	.81	5.	4.696	.152	7.870	14
5	.85	5.250	4.944	.153	8.328	14
5 1/8	.90	5.500	5.192	.154	8.792	14
5 1/4	1.05	6.	5.672	.164	10.222	14
6 1/4	1.20	6.625	6.287	.169	11.652	14
6 3/8	1.35	7.	6.652	.174	12.685	14
7 1/4	1.48	7.625	7.263	.181	14.390	14
7 3/8	1.60	8.	7.628	.186	15.522	11 1/2
8 1/4	1.75	8.625	8.249	.188	16.940	11 1/2
8 3/8	1.90	9.	8.608	.196	18.429	11 1/2
9 3/8	2.28	10.	9.582	.209	21.855	11 1/2
10 3/8	2.68	11.	10.552	.224	25.780	11 1/2
11 3/8	3.15	12.	11.514	.243	30.512	11 1/2
12 1/2	3.65	13.	12.482	.259	35.243	11 1/2
13 1/2	4.20	14.	13.448	.276	40.454	11 1/2

The permissible variation in weight is 5 per cent above and 5 per cent below.

Screw and socket furnished with threads and couplings and in random lengths, unless otherwise ordered.

Inserted joint furnished threaded and in random lengths, unless otherwise ordered.

Thickness of walls make it impracticable to cut threads of coarser pitch than shown on table.

For cut lengths, an extra charge will be made above random.

For galvanized or coated casing, an extra charge will be made above black.

SPIRAL RIVETED PIPE



FIG. 2437

When asking for estimates on Piping, specify quantities in feet or equivalent, diameter in inches or equivalent, purpose for which piping will be used and material to be conveyed.

Specify maximum working pressure under which piping will operate, and whether pump or gravity. On long lines where the head varies greatly, send profile or elevation, as several weights of piping may be used to advantage.

NO. 20 U. S. GAUGE

NO. 18 U. S. GAUGE

Size.....inches	3	4	5	3	4	5	6	7	8
Price, Asphalt Coated.....per foot	....	....	....	....	....	....	....	....	....
" Galvanized....."	....	....	....	....	....	....	....	....	....
Approx. Wt. per foot, Asphalted.....pounds	1.9	2.4	2.9	2.3	3.0	3.7	4.3	5.1	5.8
" Bursting Strength per sq. in....."	1500	1125	900	2000	1500	1200	1000	860	750

NO. 16 U. S. GAUGE

Size.....inches	4	5	6	7	8	9	10	11	12	13	14
Price, Asphalt Coated.....per foot	....	....	....	....	....	....	....	....	....	....	....
" Galvanized....."	....	....	....	....	....	....	....	....	....	....	....
Approx. Wt. per ft., Asphalted.....pounds	3.7	4.5	5.3	6.2	7.1	8.0	8.8	9.7	10.6	11.4	12.9
" Bursting Strength per sq. in....."	1875	1500	1250	1070	935	835	750	680	625	575	535

NO. 14 U. S. GAUGE

Size.....inches	6	7	8	9	10	12	14	15	16	18	20
Price, Asphalt Coated.....per foot	....	....	....	....	....	....	....	....	....	....	....
" Galvanized....."	....	....	....	....	....	....	....	....	....	....	....
Approx. Wt. per foot, Asphalted.....pounds	6.6	7.7	8.8	9.9	11.0	13.0	15.9	17.0	18.1	19.9	22.1
" Bursting Strength per sq. in....."	1560	1340	1170	1045	935	780	670	625	585	520	470

NO. 12 U. S. GAUGE

Size.....inches	6	7	8	9	10	12	14	15	16	18	20
Price, Asphalt Coated.....per foot	....	....	....	....	....	....	....	....	....	....	....
" Galvanized....."	....	....	....	....	....	....	....	....	....	....	....
Approx. Wt. per foot, Asphalted.....pounds	9.2	10.7	12.3	13.9	15.3	18.2	22.2	23.7	25.2	27.6	30.6
" Bursting Strength per sq. in....."	2170	1860	1640	1460	1310	1080	940	875	820	730	660

NO. 10 U. S. GAUGE

NO. 8 U. S. GAUGE

Size.....inches	12	13	14	15	16	18	20	16	18	20
Price, Asphalt Coated.....per foot	....	....	....	....	....	....	....	....	....	....
" Galvanized....."	....	....	....	....	....	....	....	....	....	....
Approx. Wt. per foot, Asphalted.....pounds	22.5	24.5	27.6	29.6	31.5	34.5	38.3	38.1	41.6	46.2
" Bursting Strength per sq. in....."	1410	1295	1210	1125	1050	940	840	1290	1140	1030

NO. 6 U. S. GAUGE

NO. 3 U. S. GAUGE

Size.....inches	16	18	20	22	24	16	18	20	22	24
Price, Asphalt Coated.....per foot	....	....	....	....	....	....	....	....	....	....
" Galvanized....."	....	....	....	....	....	....	....	....	....	....
Approx. Wt. per foot, Asphalted.....pounds	44.7	49.0	54.1	59.5	64.6	51.6	59.2	65.6	72.2	78.4
" Bursting Strength per sq. in....."	1520	1360	1220	1108	1015	1880	1660	1500	1364	1250

LAP WELDED STEEL BOILER TUBES



FIG. 2436

ALL WEIGHTS AND DIMENSIONS ARE NOMINAL

External Diam. Inches	Standard thickness, minimum		Nominal weight per foot, lbs.									
	Birmingham wire gauge	Ins.	Standard thickness		One extra wire gauge		Two extra wire gauges		Three extra wire gauges		Four extra wire gauges	
			Exact theoretical weight	Approx. mfg. weight	Exact theoretical weight	Approx. mfg. weight	Exact theoretical weight	Approx. mfg. weight	Exact theoretical weight	Approx. mfg. weight	Exact theoretical weight	Approx. mfg. weight
1 1/4	13	.095	1.679	1.84	1.910	2.07	2.089	2.24	2.312	2.46	2.532	2.68
2	13	.095	1.932	2.10	2.201	2.37	2.409	2.57	2.670	2.83	2.927	3.09
2 1/4	13	.095	2.186	2.38	2.492	2.68	2.729	2.92	3.028	3.21	3.322	3.50
2 1/2	12	.109	2.783	3.00	3.050	3.26	3.386	3.59	3.717	3.92	4.114	4.32
2 3/4	12	.109	3.074	3.37	3.370	3.66	3.743	4.03	4.112	4.39	4.555	4.83
3	12	.109	3.365	3.74	3.691	4.07	4.101	4.47	4.508	4.88	4.995	5.36
3 1/4	11	.120	4.011	4.45	4.459	4.90	4.903	5.34	5.436	5.87	5.901	6.33
3 1/2	11	.120	4.331	4.81	4.817	5.29	5.298	5.77	5.877	6.34	6.382	6.84
3 3/4	11	.120	4.652	5.17	5.175	5.69	5.693	6.20	6.317	6.82	6.863	7.36
4	10	.134	5.532	6.08	6.088	6.64	6.758	7.30	7.343	7.88	8.232	8.76
4 1/2	10	.134	6.248	6.87	6.879	7.50	7.639	8.26	8.304	8.92	9.316	9.92
5	9	.148	7.669	8.12	8.520	8.96	9.266	9.71	10.400	10.8	11.231	11.6
6	8	.165	10.282	10.8	11.188	11.7	12.568	13.1	13.580	14.1	14.646	15.1

LIST PRICES PER FOOT

External Diameter inches	Standard Thickness Minimum		Price, per foot				
	Birmingham Wire Gauge	Inches	Standard Thickness	One Extra Wire Gauge	Two Extra Wire Gauges	Three Extra Wire Gauges	Four Extra Wire Gauges
1 1/4	13	.095	\$.22	\$.26	\$.28	\$.31	\$.34
2	13	.095	.21	.24	.26	.28	.31
2 1/4	13	.095	.24	.27	.29	.32	.35
2 1/2	12	.109	.30	.33	.36	.39	.43
2 3/4	12	.109	.34	.37	.40	.44	.48
3	12	.109	.38	.41	.45	.49	.54
3 1/4	11	.120	.45	.49	.53	.59	.63
3 1/2	11	.120	.48	.53	.58	.64	.69
3 3/4	11	.120	.52	.57	.62	.68	.74
4	10	.134	.61	.66	.73	.79	.83
4 1/2	10	.134	.69	.75	.83	.89	.99
5	9	.148	.81	.90	.97	1.08	1.17
6	8	.165	1.08	1.17	1.31	1.41	1.52
7	8	.165	1.27	1.38	1.54	1.66	1.78
8	8	.165	1.45	1.58	1.76	1.90	2.05
9	7	.180	1.78	1.99	2.15	2.31	2.50
10	6	.203	2.22	2.39	2.57	2.79	3.04
11	5	.220	2.63	2.84	3.07	3.35	3.53
12	—	.229	2.99	3.23	3.51	3.76	4.10
13	4	.238	3.36	3.64	3.98	4.19	4.72

Boiler Tubes to special specifications, special prices on application.

Tubes more than four gauges heavier than standard will be charged per pound.

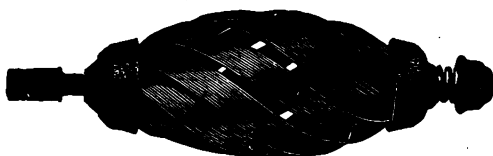


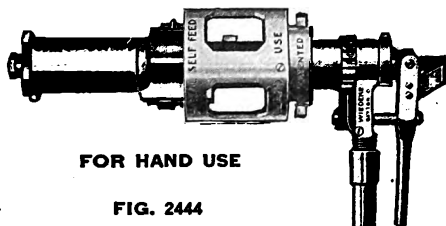
FIG. 2443

ELLIPTIC SPRING TUBE SCRAPER

Malleable iron center rod, spring steel scrapers.

Size.....inches	1 1/4	1 1/2	1 3/4	2	2 1/4	2 1/2	2 3/4	3	3 1/4	3 1/2	4
Threaded to fit pipe, inches	1/4	1/4	1/4	1/4	1/4	1/4	1/4	3/8	3/8	3/8	3/8
Weight each, lbs.....	1/2	5/8	3/4	1	1 1/4	1 1/2	1 3/4	2	2 1/4	2 1/2	2 3/4
Price, each.....	\$2.00	2.00	2.00	2.00	2.25	2.50	2.75	3.00	3.25	3.50	4.00

IDEAL SELF-FEED TUBE CUTTER



FOR HAND USE

FIG. 2444



FIG. 5052

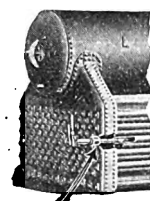


FIG. 5053

Is the only cutter upon the market that solved the problem of cutting off new steel tubes with a bevel ready for beading without cracking them, generally caused by turning them outward with a ball-faced hammer. By moving guard back, which requires a minute, you can cut out old tubes inside of boiler head or water tube boiler. (Note illustration above.) All wearing parts made of steel and tempered, making a first-class tool.

Size of Tube Cutter For outside diameter tubes.....inches	2	2 1/4	2 1/2	2 3/4	3	3 1/4	3 1/2	4	4 1/2	5	5 1/2	6
Cuts tubes I. D.....inches	1 3/8	1 1/2	1 5/8	2 1/8	2 1/2	2 5/8	3 1/8	3 3/8	4 1/8	4 1/2	4 5/8	5 3/8
Price.....complete	\$40.00	44.00	46.00	50.00	60.00	66.00	68.00	70.00	110.00	126.00	128.00	130.00
Approximate weight, boxed.....pounds	18	19	19 1/2	20	29	29 1/2	31 1/2	33	50 1/2	54	55	55 1/2
Extra Cutters, per piece.....	\$ 1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	2.00	2.60	2.60	2.60
Extra Cutters, per dozen.....	\$ 6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	12.00	15.00	15.00	15.00

IDEAL TUBE CUTTER EXTENSION



FIG. 5054

By connecting proper length extension and standing upright, outside of a smoke box, vertical, submerged, B. & W. Heine, Sterling Water Tube or any other boilers, enables you to do more work.

Size, extension.....	D-1 1/2	D-3	D-6	D-8	E-1 1/2	E-3	E-6	E-8	F-1 1/2	F-3
Price, complete.....	\$10.00	20.00	40.00	45.00	12.00	25.00	45.00	50.00	45.00	55.00
Length of Extension.....	19 in.	38 in.	6 ft.	8 ft.	19 in.	38 in.	6 ft.	8 ft.	19 in.	38 in.
Approximate weight boxed (lbs.).....	9	25	37	49	12	31	41	55	25	35
Fits Ideal Cutter, sizes.....	2"	2 1/4"	2 1/2"	2 3/4"	3"	3 1/4"	3 1/2"	4"	4 1/2"	5" 5 1/2" 6"

STANDARD ROLLER TUBE EXPANDER

The rolls and mandrel of this expander are made of good tool steel and tempered. The frame is one piece, always furnishing a good bearing to the guard. It has no collar or pin to get loose or lost throwing tool out of commission. This expander will give good ordinary service.



FIG. 2445

Size of Expander For outside dia. tubes.....inches	1	1 1/4	1 1/2	1 3/4	1 7/8	2	2 1/4	2 1/2	2 3/4
Will enter and expand tubes I. D. from.....inches	3/4 to 1	1 1/8 to 1 1/4	1 1/2 to 1 1/2	1 3/4 to 1 3/4	1 7/8 to 1 7/8	1 3/4 to 2	1 1/2 to 2 1/4	2 1/2 to 2 1/2	2 1/4 to 2 3/4
Price.....complete	\$10.00	10.00	10.00	10.00	10.00	10.00	12.00	14.00	16.00
Approx. wt. boxed.....pounds	2 1/2	2 3/4	3	4 1/4	4 1/2	5	6	7 1/2	8 1/2
Extra mandrels.....each	\$ 2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.50	3.25
Extra rolls.....each	\$ 0.20	.20	.20	.20	.20	.20	.20	.20	.35
Size of Expander For outside dia. tubes.....inches	3	3 1/4	3 1/2	3 3/4	4	4 1/4	4 1/2	5	6
Will enter and expand tubes I. D. from.....inches	2 5/8 to 3	2 7/8 to 3 1/4	3 1/8 to 3 1/2	3 3/8 to 3 3/4	3 1/2 to 4	3 1/4 to 4 1/4	4 1/8 to 4 1/2	4 1/2 to 5	5 3/8 to 6
Price.....complete	\$18.00	20.00	23.00	25.00	30.00	40.00	50.00	60.00	70.00
Approx. wt. boxed.....pounds	10 1/2	14	17	17 1/2	20 1/2	24 1/2	25	34 1/2	49 1/2
Extra mandrels.....each	\$ 3.75	4.25	4.75	5.50	5.75	6.50	8.50	10.00	11.00
Extra rolls.....each	\$ 0.35	.50	.50	.60	.60	.80	.80	1.00	1.75

STANDARD SECTIONAL TUBE EXPANDER



FIG. 2440

This expander is made completely of steel and hardened. It is for hand use only. Used mostly on fire-boxes of threshing engines and for repair work and gives good ordinary service. When ordering always state thickness of tube sheet; $\frac{3}{8}$ -inch plate for $\frac{3}{8}$ -inch thickness tube sheet and $\frac{1}{2}$ -inch plate for $\frac{1}{2}$ -inch thickness tube sheet carried in stock. All other plates are special.

Size of expander for outside diameter tubes.....inches	1	1 $\frac{1}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	2	2 $\frac{1}{4}$
Will enter and expand tubes I. D.....inches	$\frac{3}{4}$	1 $\frac{1}{8}$	1 $\frac{3}{8}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$
Price.....complete	\$12.00	12.00	12.00	12.00	12.00	13.00
Approximate weight boxed.....pounds	3	3 $\frac{1}{2}$	4	4 $\frac{1}{2}$	5	5 $\frac{1}{2}$
Extra round pins.....each	\$ 2.50	2.50	2.50	2.50	2.50	2.50
Extra coil steel springs.....each	\$.40	.40	.40	.40	.40	.40
Size of Expander for outside diameter tubes.....inches	2 $\frac{1}{2}$	2 $\frac{3}{4}$	3	3 $\frac{1}{4}$	3 $\frac{1}{2}$	4
Will enter and expand tubes I. D.....inches	2 $\frac{1}{2}$	2 $\frac{1}{2}$	2 $\frac{3}{8}$	2 $\frac{7}{8}$	3 $\frac{1}{8}$	3 $\frac{1}{2}$
Price.....complete	\$15.00	18.00	22.00	26.00	30.00	33.00
Approximate weight boxed.....pounds	7	8 $\frac{1}{2}$	9 $\frac{1}{2}$	13 $\frac{1}{2}$	14	16
Extra round pins.....each	\$ 3.00	5.00	5.00	7.00	7.00	7.00
Extra coil steel springs.....each	\$.40	.75	.75	1.00	1.00	1.00

Note:—List shows smallest inside diameter any expander passes into, enabling you to select an expander with proper range regardless if used on straight tubes, swedged tubes or pipe.

IDEAL ALL-STEEL SELF-FEED TUBE EXPANDER

Self-feeding and for power use; can also be used by hand. Furnished with frictionless phosphor bronze bearing, impossible to get out of order, reducing friction to a minimum.

All expanders have a right-hand feed and furnished with standard, detachable combination square shank mandrels. Sizes 1 inch to 1 $\frac{1}{2}$ inches inclusive, $\frac{1}{2}$ -inch square. Sizes 1 $\frac{1}{2}$ inches to 2 $\frac{3}{4}$ inches inclusive, $\frac{3}{4}$ -inch square. Sizes 3 inches to 6 inches inclusive, 1-inch square.



FIG. 2441

Size of Expander For outside dia. tubes.....inches	1	1 $\frac{1}{8}$	1 $\frac{1}{4}$	1 $\frac{3}{8}$	1 $\frac{1}{2}$	1 $\frac{5}{8}$	1 $\frac{3}{4}$	1 $\frac{7}{8}$	2
Will enter and expand tubes I. D. from.....inches	$\frac{3}{4}$ to 1	1 $\frac{1}{8}$ to 1 $\frac{1}{8}$	1 $\frac{1}{8}$ to 1 $\frac{1}{4}$	1 $\frac{1}{8}$ to 1 $\frac{3}{8}$	1 $\frac{1}{2}$ to 1 $\frac{1}{2}$	1 $\frac{5}{8}$ to 1 $\frac{5}{8}$	1 $\frac{1}{2}$ to 1 $\frac{3}{4}$	1 $\frac{3}{4}$ to 1 $\frac{7}{8}$	1 $\frac{1}{2}$ to 2
Price.....complete	\$16.00	16.00	16.00	16.00	16.00	16.00	16.00	16.00	16.00
Approx. wt. boxed.....pounds	3 $\frac{1}{2}$	4	4	4 $\frac{1}{2}$	4 $\frac{1}{2}$	6 $\frac{1}{2}$	7	7 $\frac{1}{2}$	8
Extra mandrels.....each	\$ 3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
Extra rolls.....each	\$.30	.30	.30	.30	.30	.30	.30	.30	.30
Size of Expander For outside dia. tubes.....inches	2 $\frac{1}{8}$	2 $\frac{1}{4}$	2 $\frac{3}{8}$	2 $\frac{1}{2}$	2 $\frac{5}{8}$	2 $\frac{3}{4}$	3	3 $\frac{1}{4}$	3 $\frac{1}{2}$
Will enter and expand tubes I. D. from.....inches	1 $\frac{1}{8}$ to 2 $\frac{1}{8}$	1 $\frac{1}{8}$ to 2 $\frac{1}{4}$	2 $\frac{1}{8}$ to 2 $\frac{3}{8}$	2 $\frac{1}{2}$ to 2 $\frac{1}{2}$	2 $\frac{5}{8}$ to 2 $\frac{5}{8}$	2 $\frac{1}{2}$ to 2 $\frac{3}{4}$	2 $\frac{5}{8}$ to 3	2 $\frac{3}{4}$ to 3 $\frac{1}{4}$	3 $\frac{1}{2}$ to 3 $\frac{1}{2}$
Price.....complete	\$18.00	18.00	19.50	19.50	22.00	22.00	22.00	24.50	24.50
Approx. wt. boxed.....pounds	8 $\frac{1}{2}$	9	10 $\frac{1}{2}$	11	13 $\frac{1}{2}$	14 $\frac{1}{2}$	17	18 $\frac{1}{2}$	21
Extra mandrels.....each	\$ 3.50	3.50	4.50	4.50	4.50	4.50	5.50	5.50	6.50
Extra rolls.....each	\$.30	.30	.30	.30	.60	.60	.60	.70	.70
Size of Expander For outside dia. tubes.....inches	3 $\frac{3}{4}$	4	4 $\frac{1}{4}$	4 $\frac{1}{2}$	4 $\frac{3}{4}$	5	5 $\frac{1}{4}$	5 $\frac{1}{2}$	6
Will enter and expand tubes I. D. from.....inches	3 $\frac{3}{8}$ to 3 $\frac{3}{4}$	3 $\frac{1}{2}$ to 4	3 $\frac{1}{2}$ to 4 $\frac{1}{4}$	4 $\frac{1}{8}$ to 4 $\frac{1}{2}$	4 $\frac{1}{4}$ to 4 $\frac{3}{4}$	4 $\frac{1}{2}$ to 5	4 $\frac{1}{8}$ to 5 $\frac{1}{4}$	4 $\frac{1}{8}$ to 5 $\frac{1}{2}$	5 $\frac{1}{8}$ to 6
Price.....complete	\$27.00	27.00	40.00	50.00	55.00	55.00	60.00	60.00	65.00
Approx. wt. boxed.....pounds	23	28	31	32	35	39 $\frac{1}{2}$	40 $\frac{1}{2}$	51	55
Extra mandrels.....each	\$ 6.50	7.50	10.00	10.00	15.00	15.00	18.00	18.00	20.00
Extra rolls.....each	\$.80	.80	1.10	1.10	2.00	2.00	2.50	2.50	3.00

GRATE BARS

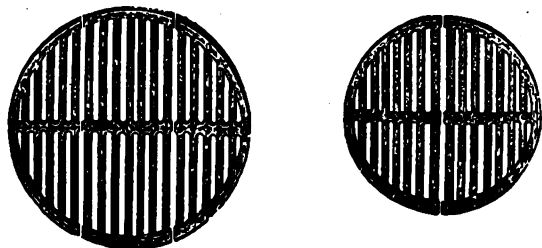


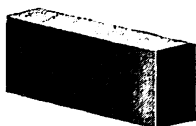
FIG. 2446

We can furnish grate bars for all types of boilers, viz: Improved, Common, Single Light Pattern and Double Light Pattern, also grate bars for Upright Boilers in two and three parts.

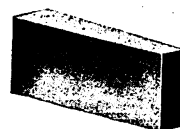
When ordering Grate Bars give length, width and style desired.

Prices upon application.

FIRE BRICK



STRAIGHT—FIG. 2447



WEDGE—FIG. 2448

STANDARD SHAPES AND APPROXIMATE DIMENSIONS

Style	Dimensions, Inches	Style	Dimensions, Inches
Straight	9x4½x2½	No. 3 Key	9x4½x2½x3
Split	9x4½x1½	No. 1 Wedge	9x4½x2½x2
Soap	9x2½x2½	No. 2 Wedge	9x4½x2½x1½
No. 1 Arch	9x4½x2½x2	End Skew	9x6½x4½x2½
No. 2 Arch	9x4½x2½x1½	Tongue & Groove	9x4½x2½
No. 3 Arch	9x4½x2½x1½	Circle	9x4½x8 x2½
No. 1 Key	9x4½x2½x4	Jamb	9x4½x5 x2½
No. 2 Key	9x4½x2½x3½	Heine Boiler	11¾x6x3½x2½

Prices on application.

FIRE TILE SQUARE EDGE

Dimensions Inches	Weight Pounds	Price Each	Dimensions Inches	Weight Pounds	Price Each
12x 6x2	9½	.....	18x 6x2	14	.....
12x10x2	15½	.....	18x18x2	42	.....
12x12x2	19	.....	24x12x3	55	.....
15x12x2	23	.....	28x12x3	64	.....
18x12x2	28	.....	20x15x3	58	.....
24x12x2	37	.....	24x15x3	69	.....
14x 6x2	11½	.....	28x15x3	80	.....
14x14x2	25	.....	30x15x3	87	.....
16x 6x2	12½	.....	36x15x3	104	.....
16x16x2	33	.....	.....	.....	.....

FLANGED EDGE

Dimensions Inches	Weight Pounds	Price Each	Dimensions Inches	Weight Pounds	Price Each
24x12x3	55	.....	28x15x3	80	.....
28x12x3	64	.....	30x15x3	87	.....
24x15x3	69	.....	36x15x3	104	.....

We can furnish any shape of Fire Tile to order. Crates and crating extra.

FIRE CLAY

Approximately 350 pounds Fire Clay is sufficient to lay 1000 Fire Bricks. This should be finely ground, mixed with water and applied thin and the bricks rubbed into place, leaving only sufficient clay between them to fill the voids.

Carloads, crude in bulk, Price per ton.....

Carloads, finely ground, in sacks, Price per ton.....

Less than carloads, Price per sack of 200 lbs.....

On Application.

FIRE BRICK DUST

Carloads in Sacks, Price per ton.....

Less than carloads, Price per sack of 200 lbs.....

On Application.

CARBORUNDUM REFRACTORIES CARBORUNDUM FIRESAND

FOR FURNACE LINING

Carborundum is a product of the electric furnace formed at a temperature of 6,000 degrees Fahrenheit. It is derived from two of the most refractory materials known to the metallurgist being chemically a compound of carbon and silica, and is produced at a temperature where the most refractory fire clays exist only as vapors. On account of its superior heat resisting properties, it is coming into extended use in the lining of various types of furnaces where high temperatures are generated, or where various conditions are encountered requiring a special selection of lining materials.

The form of Carborundum most commonly employed for refractory uses is called Carborundum Firesand. This is furnished in the form of finely ground sand and is mixed before using with a binding material such as silicate of soda or fire clay to give it proper cohesion when brought up to heat.

There is a great variation in the various grades of silicate of soda which are sold to the trade, some of them being totally unfit for furnace work. We recommend a silicate of soda of 52 degrees Beaume as being best adapted for refractory work. This must be diluted with a certain quantity of water before being added to the firesand. When clays are used, we recommend a crude fire clay of good quality. Kaolin may also be used with good results. Prepared fire clay, such as is furnished for laying up fire brick, is generally mixed with ground calcined clay or powdered fire brick, and is not suitable for the purpose.

In estimating the amount of material required for a lining of given dimensions, the weight of Carborundum Firesand mixture may be computed as 85 pounds per cubic foot.

FOR CRUCIBLE BRASS FURNACES

Carborundum Firesand is now the standard refractory material in brass furnace work and is used in carload lots by the leading brass foundries. One of its most successful applications is in the lining of the ordinary type of crucible brass furnace, replacing the fire brick lining.

We recommend for this purpose, a mixture made in accordance with the following formula:

Carborundum firesand.....	70 per cent
Ground fire clay.....	15 " "
Silicate of soda 52° Beaume.....	8 " "
Water.....	7 " "

The silicate of soda is first added to the water and thoroughly dissolved. This solution is then mixed with the clay and firesand until the material acquires the consistency of moulding sand. The constituents, when thoroughly incorporated form a plastic mixture which is easily moulded and has sufficient cohesion when tamped into place to retain its shape until fired.

A sheet iron form is provided of the same diameter as the interior of the furnace, consisting of a sheet of iron bent into cylindrical form, so that after use it can be sprung inward and be easily withdrawn. The center may also be constructed of wood and in such case should be well greased so that it can be drawn without the lining adhering to it. The mixture is rammed up solidly between the center and the outside shell of the furnace, after which the center may be at once removed and the lining dried out with a slow wood fire. It can then be immediately put in service. In cold weather it is well to warm all the materials before mixing. It is the practice in some foundries to provide channels or vents to assist in drying out the lining. This is done by placing four or five wooden strips about 2" by 1", spaced equally around the furnace inside and against the shell. These are withdrawn after tamping in lining.

FOR REPAIRING FURNACE LININGS

A mixture consisting of equal parts of Carborundum Firesand and fire clay or kaolin is invaluable for patching holes or broken parts of fire brick linings and for filling open joints in furnace walls. It is used to good advantage in ordinary crucible furnaces for brass and steel, also in copper reverberatory furnaces for keeping the side walls in repair. By its careful

use it is possible to double the life of any fire brick lining. The mixture is largely used in repairing the Schwartz Down Draft Furnace, and also as a wash applied daily after the melting. Another efficient mixture for this purpose is the one recommended for crucible brass furnace linings.

PRICES UPON APPLICATION

CARBORUNDUM FIRESAND

FOR OIL BURNING BRASS FURNACES

In the various types of tilting and rotary furnaces for melting brass now being so extensively introduced the linings are subjected to the severest possible conditions. A lining rammed up from Carborundum firesand gives much longer life than a fire brick lining, and is the most easily replaced or repaired.

We recommend a mixture in accordance with the following formula:

Carborundum firesand.....	86 per cent.
Silicate of soda 52° Beaume.....	7 " "
Water.....	7 " "

In many cases it is found advantageous to replace about 15% of the firesand with an equivalent amount of kaolin.

This mixture is thoroughly incorporated and tamped between the shell of the furnace and a strong center provided for the pur-

pose. When completed the center is carefully removed and the lining dried out at once with a slow wood-fire. It is then gradually brought up to heat by means of the oil flame and can at once be put in service. Many users of this style of furnace have found it practicable to throw in a small quantity of broken glass when first heating up the lining. This glass, when melted down, can be evenly distributed over the surface of the lining by tilting the furnace, and the interior thus acquires a smooth glazed surface which adds to the durability of the lining. Patches can easily be made in places where the lining becomes broken or worn. It is best to cut out the broken parts entirely through to the shell undercutting the old lining, in order that the new portion may be keyed into the old lining. For the purpose of repairs the same mixture is used as when putting in a new lining.

CARBORUNDUM PAINT

FOR FURNACE AND FIRE BOX LININGS

Carborundum Firesand, mixed in the form of a paint or furnace wash, is unrivalled as a protective coating for furnaces subjected to intense flame action and high temperature. It is preferably applied to new brick work, as it does not adhere so efficiently after the linings have become glazed over or covered with slag.

The mixture is made in accordance with the following formula:

Carborundum Firesand.....	65 per cent.
Ground fire clay.....	20 " "
Silicate of soda 52° Beaume.....	15 " "

To this sufficient water is added to bring it to the consistency of a thick paint, and it is applied to the surface of the lining with a broom or stiff brush. Two or three applications will give a proper coating.

Special applications of Carborundum paint are in arch and bridge walls of boiler furnaces which are subjected to severe flame action, in potters' kilns, welding furnaces and malleable iron furnaces. It is of great value in oil furnaces in protecting the brick from the well-known pitting and eating action of the high-pressure oil flame.

CARBORUNDUM LADLE LINING

The mixture recommended for lining crucible brass furnaces is also used to great advantage in lining of ladles for brass, copper or iron. This is applied in the regular way and the ladle is well dried out or baked in a core oven before being put into use.

CARBORUNDUM FIRE BRICK

Carborundum fire brick are furnished in the regular size 9 inch x 4½ inch x 2½ inch, and also in many of the special arch and key shapes. We also furnish many special shapes and forms according to specifications and drawings. Carborundum brick have shown great economy in oil furnace work of all descriptions, in connection with the melting of crucible steel in forging and welding furnaces, in electric furnaces and in brass furnaces. They are, moreover, the only brick which will stand the intense heat generated in furnaces using powdered coal fuel.

CARBORUNDUM FIRESAND

FOR TROPENAS CONVERTERS

A mixture of equal parts of Firesand and fire clay is used with entire success in repairing the brick linings of these converters which are subjected to extreme corrosion, where the flame acts upon them.

CARBORUNDUM MORTAR

We recommend for this purpose a mixture of equal parts of Carborundum Firesand and fire clay. It is used in laying up fire brick, in patching open joints and holes in brick-work and in general repairs. The life of a fire brick structure is generally limited by the life of the joints. A mortar of Carborundum Firesand is found to effectively stop the slagging and corroding at the joints.

SILICATE OF SODA

The life of a refractory lining depends upon two things: the refractory and the binder which holds that material together. The best carborundum or fire clay lining will soon burn out if it is not set with something of equal heat resistance.

The only way to make a soft binder as strong as a hard grain of sand is by chemical union. It is thus that the small particles of Carborundum Firesand or other suitable material under heat are welded together into an almost indestructible mass with a suitable form of Silicate of Soda.

Sodium Silicate is, however, a product of many forms adapted to as many purposes. The heavy jelly used for making abrasive wheels, is not suited to the requirements of the paper maker, nor will the syrupy solution of the textile trade give the chemical reaction needed in furnace lining.

"Rex" Brand Silicate of Soda has been prepared with great care for this work. With it Carborundum Firesand, fireclay and ground crucible can be moulded into lining of great endurance for:

Lining Furnaces
Repairing Old Linings
Ladle Lining
Making Furnace Paint, etc.

A few formulae follow:

Test Sample: One gallon (13 lbs.) "Rex" Brand Silicate of Soda and 100 lbs. Carborundum Firesand is enough to line an ordinary crucible furnace.

FORMULAE

NO. 1

FOR "ROCKWELL" AND OTHER OIL BURNING FURNACES

1 gal. "Rex" Brand Silicate (13.5 lbs.)
1 gal. Water..... (8 lbs.)
100 lbs. Carborundum Firesand.

Dilute the Silicate with the water. Add the Carborundum sand. Mix thoroughly until free from lumps; ram immediately into the shells around the forms.

Remove form and dry with a brisk wood or charcoal fire until the surface is quite hard (say one hour). As soon as closed, fire with gradually increasing flame from 1½ to 2 hours.

The furnace is now ready to be charged with metal.

CAUTIONS: See Below.

NO. 2

FIRECLAY FORMULA FOR GENERAL USE

10 lbs. (about ¾ gal.) "Rex" Brand Silicate
5 lbs. Fireclay
85 lbs. Carborundum Firesand

Thoroughly mix the clay and the sand; dilute the Silicate with equal parts of water; stir into the clay and sand. Apply as in formula No. 1.

NO. 3

FOR CRUCIBLE BRASS FURNACES

One gal. (13 lbs.) "Rex" Brand Silicate
34 lbs. ground fireclay
114 lbs. Carborundum firesand
11.5 lbs. water (1 ½ gals.)

Add the water to the Silicate and stir thoroughly; add this solution to the fireclay and sand until the whole has the consistency of moulding sand.

Apply as in formula No. 1.

LITTLE POINTERS

To prevent the closing of your furnace-openings by the expansion of the lining, cut back the lining from the edge of each opening at least one quarter of an inch.

Avoid using too much Silicate. An intimate chemical action is what gives endurance. The excess of any ingredient is wasteful. Use the prescribed amounts and mix your materials thoroughly.

Ram your linings by hand: it gives best results. A twisting movement places the material better than a direct blow.

NO. 4

FOR REPAIRING BRICK LINING

A mixture of equal parts of Carborundum firesand and fire-clay (or kaolin, moistened with "Rex" Brand Silicate of Soda) is invaluable for patching firebrick linings or for filling cracks in furnace walls. The life of a brick lining may be almost doubled by the careful use of this mixture. It is also used to advantage as a daily wash on the Schwartz Down Draft Furnace.

NO. 5

FURNACE PAINT

An unsurpassed coating for furnaces subjected to intense heat can be made by mixing

One gal. (13 lbs.) "Rex" Brand Silicate of Soda
17 lbs. ground fireclay
56 lbs. Carborundum firesand.

Add water enough to make a thick paint; apply two or three coats with a broom or stiff brush.

This paint is of special value in the arch and bridge walls of boiler furnaces subjected to high heat, in potter's kilns, welding and malleable iron furnaces. On oil furnaces it will protect the brick from the pitting and eating action of the high pressure flame. This paint also does good service in protecting the metal zone of foundry cupolas.

NO. 6

LADLE LINING

Formula No. 3 gives excellent service in lining ladles of brass, copper and iron.

Apply in the regular way; bake the ladle thoroughly in a core oven before using.

KALAMAZOO TRENCH BRACES

WITH
FORGED STEEL SCREWS

REGULAR TRENCH BRACE



STYLE H
FIG. 2074



STYLE HG
FIG. 2075

BALL AND SOCKET BRACE



STYLE S
FIG. 2076



STYLE SG
FIG. 2077

1½-inch Pipe Barrels. 1¼-inch Steel Screw.

1½-inch Pipe Barrels. 1¼-inch Screw.

Length When Closed Feet Inches	Extend Safely Inches	Weight Per Doz. Lbs.	Price Per Dozen
1 3	7	125	\$28.10
1 6	10	146	29.55
1 9	10	154	30.50
2 .	10	162	31.65
2 6	10	178	33.45
3 .	10	194	35.40
3 6	10	210	37.40
4 .	10	226	39.30
For mud Guard, add		45	5.70

Wrench free with every 2 dozen.

Nominal Length Feet Ins.	Actual Length Closed Feet Inches	Extend Safely Inches	Weight Per Doz. Lbs.	Price Per Doz.
1 3	1 4¾	7	147	\$32.45
1 6	1 7¾	10	164	33.80
1 9	1 10¾	10	172	34.80
2 .	2 1¾	10	180	35.75
2 6	2 7¾	10	196	37.70
3 .	3 1¾	10	212	39.75
3 6	3 7¾	10	228	41.75
4 .	4 1¾	10	244	45.65
For mud guard, add			45	7.25

Wrench free with every 2 dozen.

REGULAR HEAVY TRENCH BRACE

2-inch Pipe Barrels. 1½-inch Steel Screw.
Threaded 15 inches. Extend Safely 13 inches.

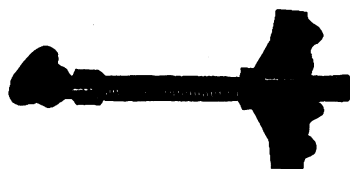
BALL AND SOCKET HEAVY BRACE

2-inch Pipe Barrels. 1½-inch Steel Screw.
Threaded 14 inches. Extend Safely 12 inches.

Length When Closed Feet Inches	Weight Per Dozen Lbs.	Price Per Dozen
3 .	277	\$44.60
3 6	299	47.00
4 .	321	49.40
4 6	353	52.35
5 .	375	55.40
5 6	397	57.15
6 .	419	60.35
6 6	441	62.15
For Mud Guard, add	80	14.10

Nominal Length Feet Inches	Actual Length Closed Feet Inches	Weight Per Doz. Lbs.	Price Per Doz.
3 .	3 2¼	322	\$52.85
3 6	3 8¼	344	55.25
4 .	4 2¼	366	57.60
4 6	4 8¼	388	60.00
5 .	5 2¼	410	62.40
5 6	5 8¼	432	64.80
6 .	6 2¼	454	67.20
6 6	6 8¼	476	69.35
For mud guard, add		80	4.70

TIMBER BRACE FITTINGS



STYLE T
FIG. 2078

These Braces are suitable for use in any width trench except the narrowest. They are especially useful in wide excavations. Making the screws of stiff steel, and bracing the caps as in the larger sizes, make these Braces most desirable for heavy and severe service. Cutting thread in cap makes these so that they may be safely extended within two inches of length of thread on screw.

Screw inches	Timber	Extend Safely Inches	Weight Per Doz. Lbs.	Price Per Dozen Ball and Socket
1¼	4x4	10	155	\$29.25
1½	4x4	12	230	40.12
1½	6x6	12	300	48.50
1¾	6x6	12	375	63.30
1¾	8x8	12	430	70.20
1¾	8x10	12	460	75.00
2	8x10	12½	575	90.10

We do not furnish any timbers.

WELL DRILLING TOOLS

WELL CASING AND PIPE

There are several kinds of Well Casing and Pipe. Each has its advantage for certain uses. The main difference between "pipe" and "casing" is in that the former is heavier and, therefore, costs from one-fourth to one-third more for a given size. In order to save mistakes in ordering, we explain the use of each. We can furnish any kind in any quantity or size, either black or galvanized, and cut to any lengths desired. Prices furnished upon application. State clearly which kind of Casing or Pipe is desired. If, for driving purposes, the pipe is desired in pieces from 6 to 7 feet long, we cut each whole length into three; and if it is desired in pieces 9 to 11 feet long, we cut each whole length into two pieces, thread the blank ends and supply the extra couplings. For this we make an extra charge for each extra cut and coupling. Pipe and Casing are always designated by the (approximate) inside diameter.

DRIVE PIPE

Diameter, Inches		Nominal weight per foot lbs.	Thickness inches	Number threads per inch	Price per foot
Nominal inside	Nominal outside				
3	3 1/2	7.54	.217	8	Prices subject to market changes
4	4 1/2	10.66	.237	8	
6	6 5/8	18.76	.280	8	
8	8 5/8	28.18	.322	8	
8	8 5/8	32	.363	8	
10	10 3/4	40.06	.366	8	
12	12 3/4	49	.375	8	

We are in a position to cut and re-thread any size pipe or casing up to 12-inch.

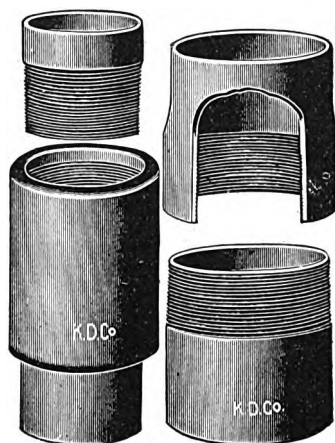


FIG. 2449
COUPLING JOINT INSERTED JOINT

COUPLING JOINT

Fig. 2449 shows the kind of coupling used on "Merchant Pipe" and upon ordinary lap-welded well-casing. The ordinary line pipe, steam pipe and pipe for fitting pumps is made in this way.

INSERTED JOINT CASING

The "Inserted Joint Casing" is made by cutting a thread on one end and swedging the other out and cutting in it an interior thread so that the end of one piece screws into the end of another. This kind of casing is not so strong at the joints as the Coupling Joint Casing and should not be driven.

FLUSH JOINT CASING

Flush Joint Casing is made by cutting interior and exterior threads on respective ends of the pipe, so that the end of one piece will screw into the other. This joint is not strong and the casing must be used with great care. This form of Casing gives the largest possible inside diameter with a given outside diameter. It should never be driven.

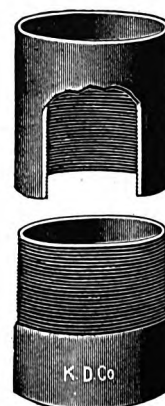


FIG. 2450—FLUSH JOINT

WELL DRILLING TOOLS

DRIVE PIPE AND FLUSH JOINT PIPE

Threads on drive pipe are straight, and the ends meet or "butt" in the center of the coupling. This pipe will stand heavy driving.

Flush joint drive pipe, tubing, or pipe is made by cutting away portions of the tubes and putting threads thereon. The pipe has the same inside and outside diameters at the joint as at other places, so that it is perfectly flush both inside and out.

A larger size of flush joint pipe can be used in wells than of pipe with couplings, but it is not so strong.

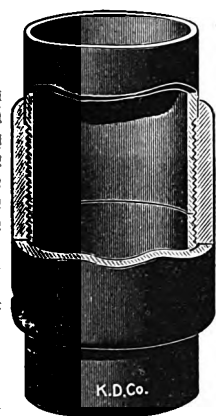


FIG. 2451
DRIVE PIPE, COUPLING
JOINT

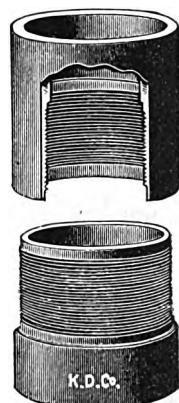


FIG. 2452
FLUSH JOINT DRIVE
PIPE AND TUBING

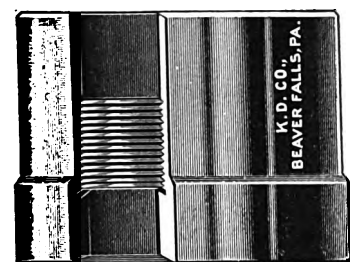


FIG. 2453

DRIVE PIPE SHOES

For protecting the lower end of the pipe in driving. The best are made of wrought steel from $\frac{3}{4}$ to 1-inch thick, and are from 5 to 8 inches long, and turned inside and outside and tempered. Another kind is made of tough cast steel, which will serve the purpose very well where there are not many boulders or where the distance driven is not too great. The bore of the shoe is about one-sixteenth of an inch less than the bore of the pipe, so as to protect the lower end of the casing or drive pipe from being injured by the sharp corners of the drill bit. A shoulder is turned out inside near the bottom on which the end of the pipe rests. Above this shoulder the shoe is threaded for screwing on the pipe to be driven, as shown by the cut-away section in the engraving.

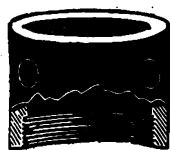
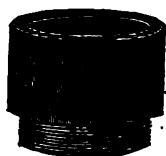
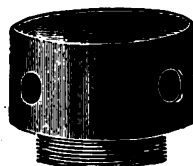
PRICE LIST

Length Inches	Thickness Inches	Size Inches						
		4½	5 or 5½	5¾	6 or 6¼	6½	7	7½
6	¾	\$18.00	\$20.25	\$22.50	\$24.00	\$26.25	\$27.75	\$30.00
8	¾	24.00	27.00	30.00	32.25	35.25	36.75	40.50
8	7/8	27.75	31.50	35.25	37.50	41.25	43.50	47.25
10	¾	30.00	33.75	37.50	39.75	44.25	46.50	50.25
10	7/8	35.25	39.00	43.50	46.50	51.00	54.00	58.50
10	1	39.75	45.00	50.25	53.25	78.50	61.50	67.50
12	¾	36.00	40.50	45.00	48.00	52.50	55.50	60.00
12	7/8	42.00	47.25	52.50	56.25	61.50	64.50	70.50
12	1	48.00	54.00	60.00	64.50	70.50	73.50	81.00
12	1¼	60.00	67.50	75.00	79.50	88.50	93.00	100.50
14	1	56.25	63.00	70.50	75.00	82.50	87.00	94.50
14	1¼	70.50	79.50	87.00	93.00	102.00	108.00	118.50
16	1	64.50	72.00	79.50	85.50	94.50	99.00	108.00
16	1¼	79.50	90.00	100.50	106.50	117.00	123.00	135.00

Length Inches	Thickness Inches	Size Inches						
		8 or 8¼	9	9¾	10	11½	12½	13½
6	¾	\$32.25	\$36.00	\$38.25	\$39.75	\$46.50	\$49.25	\$54.00
8	¾	42.75	48.00	51.00	53.25	61.50	66.00	72.00
8	7/8	49.50	56.25	60.00	63.00	72.00	78.00	84.00
10	¾	53.25	60.00	64.50	66.00	78.00	84.00	90.00
10	7/8	63.00	70.50	75.00	78.00	90.00	97.50	105.00
10	1	70.50	79.50	85.50	88.50	103.50	111.00	120.00
12	¾	64.50	72.00	76.50	79.50	93.00	100.50	108.00
12	7/8	75.00	84.00	90.00	93.00	108.00	117.00	126.00
12	1	85.50	96.00	102.00	106.50	124.50	133.50	144.00
12	1¼	104.50	120.00	127.50	133.50	154.50	166.50	180.00
14	1	99.00	112.50	120.00	124.50	145.50	156.00	168.00
14	1¼	124.50	139.50	150.00	156.00	181.50	195.00	210.00
16	1	114.00	127.50	136.50	142.50	165.00	178.50	192.00
16	1¼	142.50	160.50	171.00	178.50	207.00	222.00	240.00

Approximate Weight 2¼ pounds for each Three Dollars of List.

WE CAN FURNISH TOOLS OF ALL KINDS FOR OIL AND WATER WELL DRILLING

FIG. 2454
HOLLOW FEMALEFIG. 2455
HOLLOW MALEFIG. 2456
SOLIDFIG. 2457
DROP

WELL DRILLING TOOLS

DRIVE PIPE HEADS

HOLLOW FEMALE—TO SCREW ON PIPE
HOLLOW MALE—TO SCREW INTO COLLAR
SOLID—TO SCREW INTO COLLAR

Size, inches.....	3	4	4½	5	5½	6, 6¼	6¾	7¾	8, 8¾
Weight, lbs.....		20	20	25	33	35	35	55	64
Hollow, Each.....	\$22.00	30.00	32.00	38.00	42.00	42.00	56.00	65.00	65.00
Weight, lbs.....		35	75		78	81			204
Solid, each.....	\$19.00	20.00	20.00	25.00	27.00	30.00	34.00	50.00	50.00

Size, Ins.....	9¾	10	11½	12	12½	14OD	15OD	16OD	18OD	20OD
Weight, lbs..	77	77	120	134	137	180	240	298	363	
Hollow, each.	\$76.00	76.00	.....	100.00	120.00	150.00	160.00	200.00	230.00	300.00
Weight, lbs...		206								
Solid, each...	\$60.00	70.00	80.00	100.00	120.00	150.00				

DROP DRIVE HEADS (INSET) CALIFORNIA PATTERN

CAST IRON

Size, inches.....	6, 6¼	6¾	7	7¾	8, 8¼	9¾	10	11¾	12½
Weight, lbs.....	50	60	75	85	100	125	150	245	275
Price, each.....	\$18.00	19.00	.....	20.00	21.00	25.00	29.00	43.00	51.00

Size, Inches.....	13	13½	14	14½	15	15½	16	16½	17	17½	18
Weight, lbs.....	390	420	450	485	490	530	580	650	675	710	750
Price, each.....	\$78.00	84.00	90.00	97.00	98.00	106.00	116.00	130.00	135.00	142.00	150.00

Sizes 13, 14, 15 and 16 to 18 inch inclusive are for double and stove pipe casing.

CASING ELEVATORS

FAIR REGULAR

Casing Elevators are used for lowering casing or tubing into the well or drawing it out. One pair is required for each size of casing used. We furnish these in wrought iron; the wrought iron being safest and best for deep wells. The prices given are for two or a pair. Prices of larger sizes on application.

Size, ins....	2	2½	3	4	4½	6¼	6¾	7¾	8¼	9¾	10	11¾	12½
Link, ins...	1½	1½	1½	1¼	1¼	1¾	1¾	1¾	1¾	1¾	1¾	2	2
Wt. lbs., set.	85	95	100	118	110	250	260	300	325	400	420	460	550
Price, per set	\$72.00	75.00	78.00	79.50	87.00	148.50	156.00	183.00	186.00	217.50	225.00	234.00	252.00

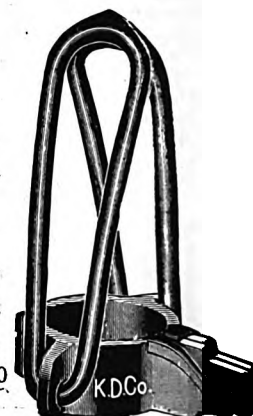


FIG. 2458

SPECIAL DRIVE PIPE CLAMP

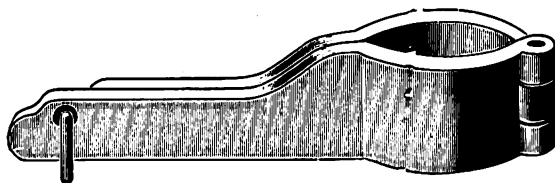


FIG. 2459

Price each.....\$24.00

ANVIL BILLET AND BLOCK

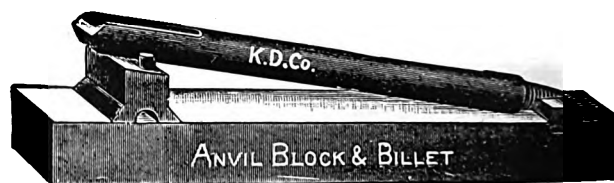


FIG. 2460

Price each.....\$10.50

WELL DRILLING TOOLS

DRILLING BITS

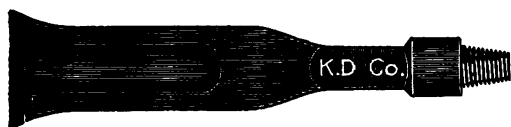


FIG. 2468

SPUDDING BIT

These bits are the best made. The cutting end is made of the best grade of crucible steel welded into the shank. They are entirely distinct from a cheaper grade of bits forged from one piece of soft steel—a grade we do not furnish unless specially ordered. Such one-piece, all-steel bits must be made of a material soft enough to make a good pin, and hence too soft to take a good temper or to do good work in hard rock.

In certain localities the rock is so soft that such one-piece bits will serve the purpose quite well. When such bits are desired we will quote prices.

PRICE LIST—SPUDDING BITS

For making 4 to 5-inch holes, with $1\frac{1}{2} \times 2\frac{1}{2}$ -inch pin.....	\$55.00
For making 5 to 8-inch holes, with 2x3-inch pin, or larger.....	60.00
For making 8 to 10-inch holes, with longer shank, and 2x3 or $2\frac{1}{2} \times 3\frac{1}{2}$ -inch pin, or larger.....	75.00
For making 9 to 12-inch holes, long shank, 75 pound steel, 2x3 or $2\frac{1}{2} \times 3\frac{1}{2}$ -inch pin, or larger.....	105.00

"MOTHER HUBBARD" BIT



FIG. 2469

This is known as a Straight or a "Paddle" Bit. It maintains its breadth of steel almost from the point to the pin collar. The breadth of steel is from $\frac{1}{2}$ to $\frac{3}{4}$ of an inch less than the width at the point; that is, to drill a 6-inch hole the steel should be $5\frac{1}{4}$ inches wide. The thickness of the steel should be a little over $\frac{1}{8}$ the diameter of the hole to be drilled. It is used in localities where the rock stands on its edge or has open crevices which would lead the drill out of plumb. It is not so good for rapid drilling as Fig. 2470, and is not furnished with rigs unless ordered specially.

FLUTED ROCK BIT



FIG. 2470

This is the standard form of bit. In ordering, always refer to the figure and give size of hole, size of pin collar and square.

PRICE LIST OF BITS, FIG. 2469 AND 2470

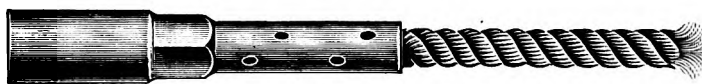
Size Hole, Inches.	Am't of Steel, Each, lbs.	Price Each	Size Hole, Inches.	Am't. of Steel, Each, lbs.	Price Each	Size Hole, Inches.	Am't. of Steel, Each, lbs.	Price Each	Size Hole, Inches	Am't. of Steel, Each, lbs.	Price Each
3	30	\$ 46.10	6 or $6\frac{1}{4}$	60	\$ 86.10	$7\frac{5}{8}$	150	\$151.50	11	150	\$176.00
3	40	50.40	6 or $6\frac{1}{4}$	80	93.20	$7\frac{5}{8}$	175	168.80	12	200	228.40
4 or $4\frac{1}{4}$	40	54.00	6 or $6\frac{1}{4}$	100	103.50	$7\frac{5}{8}$	200	186.00	12	250	246.60
4 or $4\frac{1}{4}$	50	58.70	6 or $6\frac{1}{4}$	120	115.20	8 or $8\frac{1}{4}$	80	116.20	12	300	283.50
4 or $4\frac{1}{4}$	60	63.90	6 or $6\frac{1}{4}$	150	131.00	8 or $8\frac{1}{4}$	100	131.00	12	350	310.50
$4\frac{1}{2}$	50	64.80	6 or $6\frac{1}{4}$	175	123.10	8 or $8\frac{1}{4}$	120	142.50	13	200	320.00
$4\frac{1}{2}$	60	69.80	6 or $6\frac{1}{4}$	200	155.10	8 or $8\frac{1}{4}$	150	158.70	13	250	271.00
$4\frac{1}{2}$	80	80.70	$6\frac{5}{8}$	80	109.40	8 or $8\frac{1}{4}$	175	176.00	13	300	298.40
5	50	66.50	$6\frac{5}{8}$	100	123.90	8 or $8\frac{1}{4}$	200	191.20	13	400	346.50
5	60	71.40	$6\frac{5}{8}$	120	132.00	8 or $8\frac{1}{4}$	250	219.60	14	250	273.00
5	80	81.20	$6\frac{5}{8}$	150	148.00	8 or $8\frac{1}{4}$	300	248.00	14	300	303.00
5	100	90.90	$6\frac{5}{8}$	175	159.30	10	150	175.00	14	400	354.60
$5\frac{5}{8}$	60	73.20	$6\frac{5}{8}$	200	170.30	10	175	192.20	16	300	322.70
$5\frac{5}{8}$	80	81.90	$7\frac{5}{8}$	80	115.80	10	200	209.30	.....	.....	.....
$5\frac{5}{8}$	100	92.30	$7\frac{5}{8}$	100	127.70	10	250	236.70	.....	.....	.....
$5\frac{5}{8}$	120	102.60	$7\frac{5}{8}$	120	139.10	10	300	263.70	.....	.....	.....

ALL STEEL BITS CAN ALSO BE FURNISHED

WE CAN FURNISH TOOLS OF ALL KINDS FOR OIL AND WATER WELL DRILLING

WELL DRILLING TOOLS

ROPE SOCKETS



STANDARD KEYSTONE—FIG. 2464



PATENT—FIG. 2462



NEW ERA—FIG. 2463



SUB—FIG. 2465



WING—FIG. 2466

DIMENSIONS AND PRICES

Size Box, ins.....	1½x1¾	1½x2¼	1½x2½	2x3	2¼x3¼	2½x3½	2¾x3¾	3x4	3¼x4¼	3½x4½	4x5
Size Collar, inches.....	2⅝	3¼	3⅝	4¼	4¾	5	5½	6	6¾	6¾	7⅝
Size Square, inches.....	1⅞	2½	2½	3	3½	4	4	4½	5	5	5½
Price Keystone.....	\$28.50	34.50	34.50	36.00	40.50	45.00	46.50	54.00	.....	.....	.....
Price Wing.....	\$28.50	34.50	34.50	36.00	40.50	45.00	46.50	54.00	.....	.....	.....
Price Patent.....	.....	.....	.....	\$49.50	55.00	60.00	60.00	75.00	.....	.....	.....
Price Sub.....	.....	.....	.....	\$63.00	69.00	75.00	75.00	90.00	.....	.....	.....
Price New Era.....	.....	.....	.....	\$63.00	69.00	75.00	75.00	90.00	96.00	99.00	108.00

WEIGHTS WITH 2x3 BOX

Keystone—60 lbs. Patent—75 lbs. Wing—60 lbs. Sub—125 lbs. New Era—125 lbs.

DRILLING JARS

These jars are made entirely of steel, very strong.

For fishing it is sometimes better to have a long stroke, but for drilling the shorter stroke jars are more durable, make less dead weight on the machine and are in every way more preferable.

DIMENSIONS AND PRICES

Diameter, inches.....	2½	2¾	3	3¼	3½	3¾	4	4¼	4½	4¾
Size Hole for, inches....	3	3¼	3½	3¾	4	4¼	4½	5	5⅞	5½
Size Box & Pin, inches..	1x1¾	1x1¾	1x1¾	1x1¾	1½x2½	1¾x2¾	1¾x2¾	1¾x2¾	2x3	2x3
Weight, lbs.....	60	65	70	80	120	150	160	180	260	280
4-Inch Stroke, Per Set..	\$120.00	125.00	131.00	137.00	147.00	150.00	153.00	156.00	168.00	175.00
Weight, lbs.....	62	67	72	83	123	154	165	185	267	288
6-Inch Stroke, Per Set..	\$123.00	128.00	134.00	140.50	150.50	153.50	156.50	160.00	172.00	179.00
Weight, lbs.....	64	70	75	86	127	158	170	191	275	296
8-Inch Stroke, Per set...	\$126.00	131.00	137.00	144.00	154.00	157.00	160.00	164.00	176.00	183.00

Diameter, inches.....	5	5¼	5½	5¾	6	6¼	6½	6¾	7
Size Hole for, inches....	5⅝	5⅞ to 6⅝	6¼ to 10	6⅝ to 12	7⅝ to 14	7⅝ to 14	8 & Larger	8 & Larger	8 & Larger
Size Box & Pin, inches..	2¼x3¼	2¼x3½	2¾x3¾	2¾x3¾	3x4	3x4	3x4	3x4	4x5
Weight, lbs.....	300	325	420	450	475	500	525	550	700
4-Inch Stroke, Per Set..	\$182.00	190.00	210.00	226.00	242.00	254.00	268.00	284.00	317.00
Weight, lbs.....	309	334	429	459	485	511	537	564	716
6-Inch Stroke, Per set..	\$186.00	194.00	214.00	230.00	246.00	258.00	273.50	289.00	322.00
Weight, lbs.....	318	343	438	468	495	523	550	579	732
8-Inch Stroke, Per Set..	\$190.00	198.00	218.00	234.00	250.00	262.00	278.00	294.00	328.00



FIG. 2467

WE CAN FURNISH TOOLS OF ALL KINDS FOR OIL AND WATER WELL DRILLING

WELL DRILLING TOOLS

TOOL SUBSTITUTES

When ordering substitutes, state exact size of box, of pin and of wrench square desired.

Size	Wgt. Lbs.	Price Each	Size	Wgt. Lbs.	Price Each
1 5/8 x 2 1/2 — 8 Pin to 1 3/4 x 2 3/4 — 8 Box	60	\$30.00	2 1/2 x 3 1/2 — 7 Pin to 2 3/4 x 3 3/4 — 7 Box	120	\$51.00
1 5/8 x 2 1/2 — 8 Box to 1 3/4 x 2 3/4 — 8 Pin	60	30.00	2 1/2 x 3 1/2 — 7 Box to 2 3/4 x 3 3/4 — 7 Pin	120	51.00
2 x 3 — 7 Pin to 2 1/4 x 3 1/4 — 7 Box	85	41.25	2 1/2 x 3 1/2 — 7 Pin to 3 x 4 — 7 Box	135	58.25
2 x 3 — 7 Box to 2 1/4 x 3 1/4 — 7 Pin	85	41.25	2 3/4 x 3 3/4 — 7 Box to 3 x 4 — 7 Pin	130	58.25
2 x 3 — 7 Pin to 2 1/2 x 3 1/2 — 7 Box	105	43.50	2 3/4 x 3 3/4 — 7 Pin to 3 x 4 — 7 Box	140	60.00
2 x 3 — 7 Box to 2 1/2 x 3 1/2 — 7 Pin	100	43.50	2 3/4 x 3 3/4 — 7 Box to 3 x 4 — 7 Pin	135	60.00
2 x 3 — 7 Pin to 2 3/4 x 3 3/4 — 7 Box	110	47.25	3 x 4 — 7 Pin to 3 1/4 x 4 1/4 — 7 Box	175	71.25
2 x 3 — 7 Box to 2 3/4 x 3 3/4 — 7 Pin	105	47.25	3 x 4 — 7 Box to 3 1/4 x 4 1/4 — 7 Pin	175	71.25
2 x 3 — 7 Pin to 3 x 4 — 7 Box	125	52.50	3 x 4 — 7 Pin to 3 1/2 x 4 1/2 — 7 Box	180	76.50
2 x 3 — 7 Box to 3 x 4 — 7 Pin	115	52.50	3 x 4 — 7 Box to 3 1/2 x 4 1/2 — 7 Pin	175	76.50
2 1/4 x 3 1/4 — 7 Pin to 2 1/2 x 3 1/2 — 7 Box	110	45.00	3 x 4 — 7 Pin to 4 x 5 — 7 Box	200	81.00
2 1/4 x 3 1/4 — 7 Box to 2 1/2 x 3 1/2 — 7 Pin	105	45.00	3 x 4 — 7 Box to 4 x 5 — 7 Pin	185	81.00
2 1/4 x 3 1/4 — 7 Pin to 2 3/4 x 3 3/4 — 7 Box	115	48.75	3 1/4 x 4 1/4 — 7 Pin to 4 x 5 — 7 Box	205	86.25
2 1/4 x 3 1/4 — 7 Box to 2 3/4 x 3 3/4 — 7 Pin	110	48.75	3 1/4 x 4 1/4 — 7 Box to 4 x 5 — 7 Pin	195	86.25
2 1/4 x 3 1/4 — 7 Pin to 3 x 4 — 7 Box	130	54.75	3 1/2 x 4 1/2 — 7 Pin to 4 x 5 — 7 Box	210	93.00
2 1/4 x 3 1/4 — 7 Box to 3 x 4 — 7 Pin	130	54.75	3 1/2 x 4 1/2 — 7 Box to 4 x 5 — 7 Pin	200	93.00

FIG. 2471

DOUBLE IMPROVED UNDER REAMER

Size, Inches	Size Hole for, Inches	Size of Pin, Inches	Weight Pounds	Price Each	Weight Pounds	Price Cutters, per Set
3 1/4	4 1/4	1 x 1 3/4	75	\$135.00	8	\$22.50
3 1/2	4 1/2	1 x 1 3/4	90	142.50	9	26.25
4	5	1 5/8 x 2 1/2	110	150.00	10	30.00
4 1/4	5 1/2	1 3/4 x 2 3/4	125	168.75	11	33.75
4 1/2	5 5/8	1 3/4 x 2 3/4	155	187.50	12	37.50
5	6 5/8	2x3	230	210.00	18	45.00
5 5/8	7 1/2	2x3	300	300.00	25	45.00
6 1/4	8	2x3	325	322.50	28	48.00
6 5/8	8	2x3	345	330.00	30	52.50
7	9	2x3	390	337.50	45	54.00
7 5/8	9 5/8	3x4	440	375.00	65	60.00
8 1/4	10	3x4	500	397.50	70	63.00
9	11	3x4	560	412.50	100	67.50
9 5/8	11 5/8	3x4	625	450.00	120	72.00
10	12 1/2	3x4	690	465.00	140	75.75
11	13 1/2	3x4	840	487.50	170	78.75
11 5/8	14	3x4	925	525.00	220	82.50
12 1/2	15	3x4	1125	577.50	240	87.00
13 1/2	16	3x4	1175	637.50	270	90.00
14 1/2	17 1/2	3x4	1300	735.00	285	105.00
15 1/2	18	3x4	1425	840.00	300	120.00
16	18 1/2	3x4	1485	930.00	315	127.50
17	20 1/2	3x4	1625	1027.50	330	135.00
18	21 1/2	3x4	1750	1125.00	350	150.00

FIG. 2472
CUTTERS
CONTRACTED
TO ENTER
CASINGFIG.
CUTTERS
EXPANDED FOR
REAMING

FOUR WING STAR BITS ALL STEEL



FIG. 2474

Size Hole for inches	4	4 1/4	5	5 1/4	5 3/8	6 1/4	6 3/8
Size of Pin inches	1 5/8 x 2 1/2	1 5/8 x 2 1/2	2x3	2x3	2 1/4 x 3 1/4	2 3/4 x 3 3/4	2 3/4 x 3 3/4
Weight pounds	125	150	215	240	275	325	380
Size Hole for inches	7 5/8	8 1/4	10	12	13	14 1/2	16
Size of Pin inches	2 3/4 x 3 3/4	2 3/4 x 3 3/4	3x4	3 1/4 x 4 1/4	3 1/4 x 4 1/4	3 1/4 x 4 1/4	3 1/4 x 4 1/4
Weight pounds	450	475	575	1000	1150	1350	1600

Star bits sold by weight. Price upon application.

WELL DRILLING TOOLS TOOL SUBSTITUTES

TAPER JOINTS

With seven flat threads, seven or eight V Threads per inch.

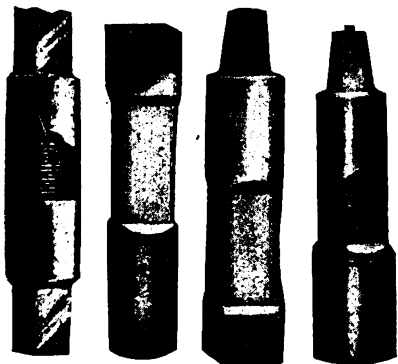


FIG. 2475

PRICE LIST OF JOINTS

Size inches	1x1 3/4	1 1/2 x 2 1/2	1 3/4 x 2 3/4	2x3
No. of Thds. to inch...	8	8	8	7 or 8
Size Square,.... inches	..	..	..	3 1/2
Dia. of Box Collar "	2 5/8	3 3/4	4	4 1/2
Weight lbs.	20	50	60	75
Box, Price..... each	\$9.75	11.25	12.75	15.75
Dia. Pin Collar, inches.	2 1/2	3 1/2	3 3/4	4 1/4
Weight lbs.	18	45	55	65
Pin, Price..... each	\$8.25	9.75	12.25	14.25

Size inches	2 1/4 x 3 1/4	2 1/2 x 3 1/2	2 3/4 x 3 3/4	3x4	3 1/4 x 4 1/4	3 1/2 x 4 1/2	4x5
No. of Thds. to inch.....	7	7	7	7	7	7	7
Size Square,.... inches	3 1/2	4	4	4 1/2	5	5	5 1/2
Dia. of Box Collar,.... inches	4 3/4	5 1/4	5 1/2	6	6 1/2	6 3/4	7 1/4
Weight, lbs.	85	100	115	135	180	190	240
Box, Price..... each	\$17.25	19.50	21.40	25.50	30.00	33.75	36.75
Dia. Pin Collar..... inches	4 1/2	5	5 1/4	5 3/4	6 1/4	6 1/2	7
Weight lbs.	75	90	105	130	170	180	230
Pin, Price..... each	\$15.75	18.00	20.00	24.00	28.50	32.25	35.25

Unless otherwise specified joints will be threaded as follows: 1 1/2 x 2 1/2 inch and 2 x 3 inch 8 threads per inch. 2 1/4 x 3 1/4 inch and larger 7 threads per inch.

BOXES AND PINS



PIN—FIG. 2476



BOX—FIG. 2477

PRICE LIST OF SUBSTITUTES

Pin or Box..... inches	1 1/2 x 2 1/2 to 1 3/4 x 2 3/4	1 5/8 x 2 1/2 to 2x3	1 3/4 x 2 3/4 to 2x3	2x3 to 2 1/4 x 3 1/4	2x3 to 2 1/2 x 3 1/2	2x3 to 2 3/4 x 3 3/4	2x3 to 3x4	2 1/4 x 3 1/4 to 2 1/2 x 3 1/2	2 1/2 x 3 1/2 to 2 3/4 x 3 3/4	2 3/4 x 3 3/4 to 3x4
Box or Pin..... "	1 3/4 x 2 3/4	2x3	2x3	2 1/4 x 3 1/4	2 1/2 x 3 1/2	2 3/4 x 3 3/4	3x4	2 1/2 x 3 1/2	2 3/4 x 3 3/4	3x4
Weight, lbs.	60	70	75	85	105	110	125	110	115	130
Price..... each	\$22.50	25.50	27.00	31.50	33.00	36.00	39.00	33.75	36.00	41.25

Pin or Box..... inches	2 1/2 x 3 1/2 to 2 3/4 x 3 3/4	2 1/2 x 3 1/2 to 3x4	2 3/4 x 3 3/4 to 3x4	3x4 to 3 1/4 x 4 1/4	3x4 to 3 1/2 x 4 1/2	3x4 to 4x5	3 1/4 x 4 1/4 to 3 1/2 x 4 1/2	3 1/2 x 4 1/2 to 4x5	3 3/4 x 4 1/4 to 4 1/4 x 4 1/2	4 1/4 x 4 1/2 to 4x5
Box or Pin..... inches	2 3/4 x 3 3/4	3x4	3x4	3 1/4 x 4 1/4	3 1/2 x 4 1/2	4x5	3 1/2 x 4 1/2	4x5	4 1/4 x 4 1/2	4x5
Weight, lbs.	120	135	140	175	180	200	210	230	235	235
Price..... each	\$ 38.25	42.00	45.00	54.00	57.00	60.75	61.50	65.25	69.75	69.75

ROUND BIT GAUGES

As the gauge is used while the bit is hot, it should be about one-sixteenth of an inch larger than the hole to be drilled to allow for the shrinkage of the bit in cooling.

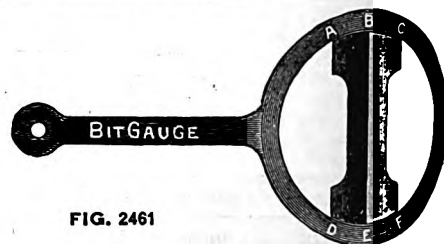


FIG. 2461

Size, inches.....	4 1/2	5	5 5/8	6	6 5/8	7 5/8	8	9 5/8	10	11 5/8	12 1/2	13	13 1/2	14	16
Weight, lbs.....	1 1/4	1 1/2	1 1/2	1 1/2	1 3/4	2	2 1/2	3	3	3 3/4	3 1/2	3 3/4	3 3/4	3 3/4	4 1/2
Price, each.....	\$3.00	3.15	3.30	3.75	3.90	4.20	4.50	4.80	4.95	5.85	6.60	6.60	7.35	7.35	8.25

WE CAN FURNISH TOOLS OF ALL KINDS FOR OIL AND WATER WELL DRILLING

WELL DRILLING TOOLS

AUGER STEMS AND SINKER BARS

Diameter, Inches	2½		2¾		3		3¼		3½		3¾		4		4¼		4½		5	
Size Box and Pin, Inches	1x1½		1½x2½		1¾x2¾		2x3		2¼x3¼		2½x3½		2¾x3¾		3x4		3¼x4¼		3½x4½	
Length, Feet	Weight, Pounds	Price Each	Weight, Pounds	Price Each	Weight, Pounds	Price Each	Weight, Pounds	Price Each	Weight, Pounds	Price Each	Weight, Pounds	Price Each	Weight, Pounds	Price Each	Weight, Pounds	Price Each	Weight, Pounds	Price Each	Weight, Pounds	Price Each
4	70	\$31.00	80	\$31.40	120	\$36.00	125	\$36.50	175	\$46.25	177	\$46.50	275	\$54.00	280	\$59.00	320	\$64.50	470	\$90.00
6	107	32.50	120	33.20	167	38.25	180	39.00	240	49.25	252	50.00	360	58.00	375	63.50	427	69.75	600	98.00
8	140	34.00	160	35.00	215	40.50	236	41.50	306	52.25	328	53.50	446	62.00	470	68.25	535	74.75	740	102.00
10	173	35.50	200	36.80	260	42.50	292	44.25	370	55.25	402	57.00	532	66.00	568	72.75	643	80.00	875	108.00
12	206	37.00	240	38.60	308	44.75	348	46.75	437	58.25	477	60.50	618	70.00	664	77.50	750	85.00	1000	114.00
14	239	38.50	280	40.40	356	47.00	404	49.50	503	61.50	552	64.00	704	74.00	761	82.00	860	90.00	1140	120.00
16	272	40.00	320	42.20	404	49.00	461	52.00	569	64.50	627	67.50	790	78.00	857	86.50	967	95.00	1275	126.00
18	305	41.50	360	44.00	455	51.25	518	54.50	635	67.50	702	71.00	876	82.00	954	91.00	1075	100.00	1400	132.00
20	338	43.00	400	45.80	503	53.25	575	57.25	700	70.50	777	74.50	962	86.00	1050	95.50	1185	106.00	1550	138.00
22	371	44.50	440	47.60	552	55.50	630	59.75	767	73.50	852	78.00	1048	90.00	1147	100.00	1290	111.00	1680	144.00
24	404	46.00	480	49.40	600	57.50	687	62.50	833	76.50	927	81.50	1134	94.00	1243	104.75	1400	116.00	1800	150.00
26	437	56.25	520	59.95	648	59.75	743	65.00	900	79.50	1002	85.00	1220	98.00	1340	109.50	1507	121.00	1950	156.00
28	470	57.75	560	61.75	696	62.00	800	67.50	966	82.50	1077	88.75	1306	102.00	1436	114.00	1616	126.00	2080	162.00
30	503	59.25	600	63.50	744	64.00	856	70.00	1032	85.50	1152	92.25	1392	106.00	1533	118.50	1723	131.00	2200	168.00
32	...	...	...	...	792	76.75	913	83.25	1097	101.50	1227	109.00	1478	123.00	1630	139.00	1830	152.00	2350	195.00
34	...	...	...	...	840	78.75	969	85.75	1162	104.50	1302	122.50	1563	127.00	1726	143.50	1938	157.00	2542	201.00
36	...	...	...	...	888	81.00	1025	88.50	1227	107.50	1377	116.00	1648	131.00	1822	148.00	2046	162.00	2734	207.00
38	...	...	...	...	936	83.00	1080	91.00	1292	110.50	1452	119.50	1733	135.00	1918	152.50	2154	167.50	2926	213.00
40	...	...	...	...	984	85.00	1136	93.50	1357	113.50	1527	123.00	1818	139.00	2014	157.00	2262	172.50	3120	219.00

EXTRA FOR LARGER BOXES AND PINS

Additional Price for above with, Inches	Diameter, Inches											
	2½	2¾	3	3¼	3½	3¾	4	4¼	4½	5	5½	6
2 x3 Box and Pin	\$3.35	...	...	...	...	...	...	...	...	...
2¼x3¼ Box and Pin
2½x3½ Box and Pin	\$3.35	...	...	...	...	...	...	...
2¾x3¾ Box and Pin	\$3.34	...	...	...	...	...	...
3½x4½ Box	\$3.34	...	...	...
4 x5 Box	8.33	...	...

DRIVE CLAMPS

Size Sq. In.	Bolts In.	Material	Wt. lbs.	Price Each
2¾	2 x10	3½x3½x12	110	\$26.25
3¼	2 x12	4 x4 x14	155	37.50
3¾	2 x13	4½x4½x14	190	45.00
4¼	2 x13	4½x4½x16	215	51.75
4¾	2½x13	4½x4½x16	235	57.25
4¾	2½x14	5 x5 x18	310	73.25
4¾	2½x16	6 x6 x18	420	100.00
4¾	2¾x14	5 x5 x18	320	76.00
4¾	2¾x16	5 x6 x18	375	90.00
4¾	2¾x16	6 x6 x18	435	104.00
4¾	3 x16	6 x6 x20	490	118.00
5	3 x16	6 x6 x20	490	118.00

DRIVE CLAMP BOLTS

Size Inches	Weight lbs.	Price Each	Size Inches	Weight lbs.	Price Each
2 x10	20	\$4.50	2½x17	45	\$10.15
2 x11	21	5.00	2½x18	46	10.50
2 x12	22	5.25	2¾x14	50	11.25
2 x13	23	5.50	2¾x15	52	11.55
2 x14	24	6.00	2¾x16	54	12.00
2 x15	25	6.40	2¾x17	56	12.40
2 x16	26	6.75	2¾x18	58	12.75
2½x12	37	8.25	3 x14	60	13.50
2½x13	39	8.60	3 x15	62	14.00
2½x14	40	9.00	3 x16	64	14.25
2½x15	42	9.40	3 x17	66	14.60
2½x16	43	9.75	3 x18	68	15.00

WE CAN FURNISH TOOLS OF ALL KINDS FOR OIL AND WATER WELL DRILLING

WELL DRILLING TOOLS

TOOL WRENCHES

A pair consists of one right hand and one left hand wrench. If only one wrench is wanted, specify which. The very heavy sizes have a loop for lifting.



FIG. 2481

Size of Square, in..	1 1/4	2 1/2	2 3/4	3 1/4	3 1/2	3 3/4	3 1/2	3 1/2	3 1/2	4	4	4	4 1/4	4 1/4	4 1/4	4 1/2	4 1/2
Wt. each, lbs.....	50	75	75	112	135	150	175	175	190	200	225	250	200	250	300	275	300
Price per set of 2.	\$56.00	60.00	60.00	64.00	70.00	75.00	82.00	82.00	87.00	90.00	100.00	112.00	90.00	112.00	135.00	125.00	135.00

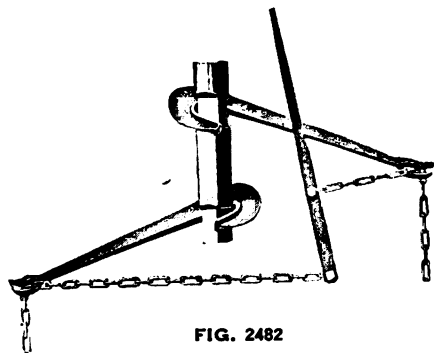


FIG. 2482

CHAIN WRENCH BAR

Tool Wrenches with claw ends, as shown in cut, will be furnished at same price as regular Tool Wrenches.

Price of Bar and Chain..... \$15.00

DRIVE CLAMP WRENCHES

Size In.	For Size Bolt In.	Weight lbs.	Price Each
3	2	25	\$ 6.00
3 7/8	2 1/2	40	9.75
4 1/4	2 3/4	50	12.00
4 5/8	3	60	14.25

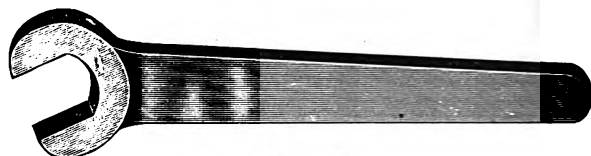


FIG. 2483

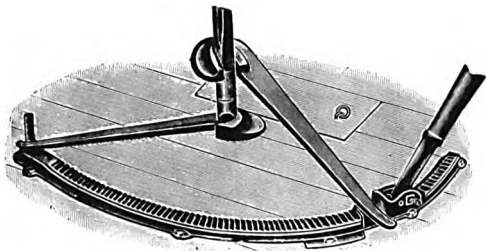


FIG. 2484

FLOOR JACK

For screwing up the joints on drilling tools. Made strong and heavy for large tools. It is fastened to the floor with lag screws or bolts.

No. 1 Double-Acting, Wt. 209 lbs. Price each..... \$ 98.00

No. 2 Double-Acting, Wt. 280 lbs. Price each..... \$135.00

Price includes wood handle.

DERRICK CRANES

It is used in connection with Swivel Wrench, for handling drill bits.

	Weight Pounds	Price Each
Complete with 1x5 Inch Arm.....	346	\$45.00
Complete with 1x6 Inch Arm.....	376	70.00

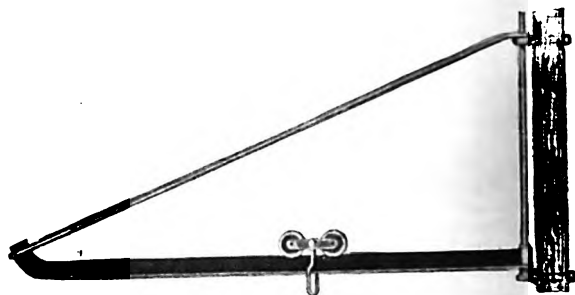


FIG. 2485

WE CAN FURNISH TOOLS OF ALL KINDS FOR OIL AND WATER WELL DRILLING

WELL DRILLING TOOLS

STEEL PIPE PULLING RINGS

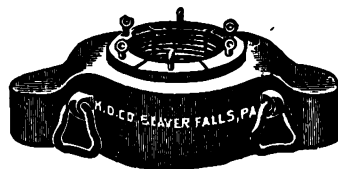


FIG. 2488

Cut shows a ring and wedges made of cast steel for use with hydraulic or screw jacks. Around the inside of the ring are placed toothed steel wedges, which take an equal hold around pipe as the pressure is put under the pipe ring. Rings made for 8 inch pipe can be used for both 6 and 8 inch pipe by having two sets of wedges.

Ring, with wedges, for 6-inch pipe, Price each.....	\$120.00
Ring, with wedges, for 8-inch pipe, Price each.....	180.00
Ring, with wedges, for both 6 and 8-inch pipe, Price each.....	210.00

Can also be furnished made of cast iron.

PIPE PULLING JAR

Used in withdrawing pipe from the ground when test has been completed, as in placer prospecting.

Pipe Jars, Price each.....	\$150.00
Knocking Head, Price each.....	22.50

TEMPER SCREWS

These Temper Screws are made of steel and swiveled below, and have either a T like Fig. 2487 or a hook at the top, as Fig. 2486, or an eye, as may be ordered.

Diam. in.....	1 1/8	1 1/2	1 3/4	2
Length, feet.....	3	3 1/2	4	5
Price, each.....	\$66.00	72.00	84.00	150.00

KNOCKING HEAD.
FIG. 2489

WIRE LINE EQUIPMENT

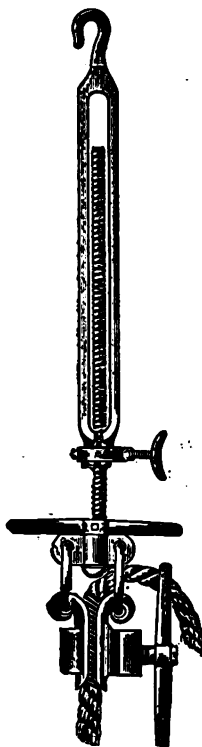
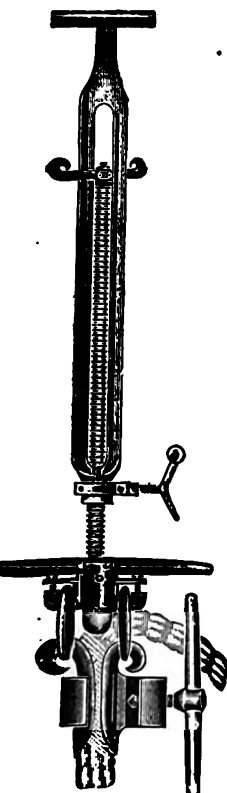
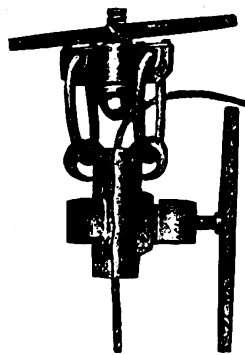
When drilling at depth of 500 feet or more, where the well stands nearly full of water, it is of advantage to use Wire Line instead of Manila Cable, on account of the great reduction in friction.

The well is drilled 150 or 200 feet deep with Manila Cable in the usual way. A piece of Manila Cable about 150 feet long is left attached to the regular rope socket to provide a certain necessary spring and elasticity. The wire drilling cable is attached to the Manila by means of the Shackle, Fig. 2491.

A special Temper Screw Clamp for Wire Line, Fig. 2492, is readily substituted for the rope clamps on the regular Temper Screw.

The Wire Line is never used for Spudding, but only with the Temper Screw.

The Wire Sand Line is tied direct to the sand pump and used precisely as Manila Sand Line, except that the operator must be careful not to throw kinks in it. Also see that the sheave for 1/4-inch Sand Line is not less than 8 or 9 inches in diameter; that for 3/8-inch should not be less than 12 inches in diameter.

FOR LIGHT MACHINES
FIG. 2486USED ON OIL RIGS
FIG. 2487WIRE LINE SHACKLE
FIG. 2491TEMPER SCREW CLAMPS FOR WIRE LINE
FIG. 2492

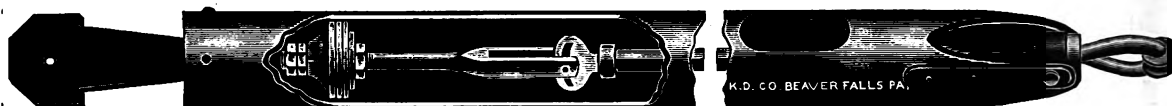
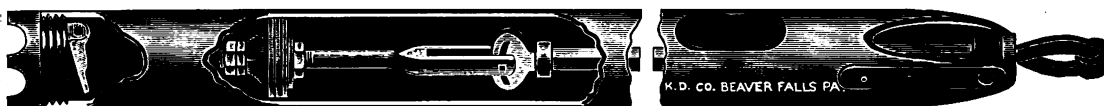
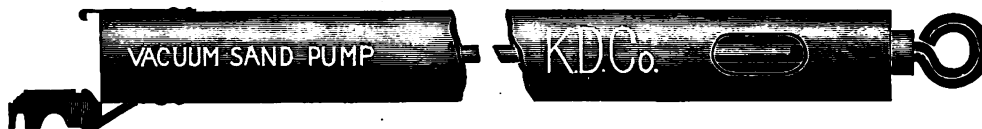
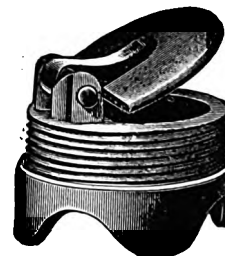
WIRE ROPE SHACKLE OR COUPLINGS, FOR CONNECTING WIRE DRILLING CABLE TO MANILA—FIG. 2491

5/8 Wire to 1 1/4 Manila.....	\$15.00
3/4 Wire to 1 1/4 or 1 1/2 Manila.....	\$15.00
7/8 Wire to 1 1/2, 2 or 2 1/4 Manila.....	\$18.00

SPECIAL WIRE ROPE CLAMPS FOR TEMPER SCREW—FIG. 2492

For 5/8 or 3/4 Wire Cable.....	\$36.00
For 3/4 or 7/8 Wire Cable.....	\$45.00

PIPE JARS
FIG. 2490

WELL DRILLING TOOLS**SAND PUMPS AND BAILERS****BAILER WITH DART VALVE**
FIG. 2493**BAILER WITH FLAT VALVE**
FIG. 2494**VACUUM SAND PUMP WITH DART VALVE**
FIG. 2495**VACUUM SAND PUMP WITH FLAT VALVE AND SCREW BOTTOM**
FIG. 2496**VACUUM SAND PUMP WITH FLAT VALVE AND RIVETED BOTTOM**
FIG. 2497**VACUUM SAND PUMP WITH DROP BOTTOM**
FIG. 2498**SAND PUMP VALVES****FLAT VALVE, RIVETED BOTTOM**
FIG. 2499**FLAT VALVE, SCREW BOTTOM**
FIG. 2500

Size, inches.....	2	3	3¾	4½	5	5½
Fig. 2499 Cast Iron.....	\$3.75	\$4.50	\$ 5.25	\$ 6.00	\$ 6.75	\$ 7.50
Fig. 2499 Cast Steel.....	7.50	9.00	10.50	12.00	13.50	15.00
Fig. 2500		7.50	9.75	13.50	15.00	16.50

Dimensions given for Sand Pump Bottoms are internal diameter of Sand Pump to fit.

MACHINERY SECTION

On pages 800 to 899 following we have illustrated and described in a brief way only the principal lines of machinery that we are in position to furnish for:

BOX FACTORIES
CONTRACTORS
FURNITURE FACTORIES
GARAGES
MACHINE SHOPS
MANUFACTURING PLANTS
MINES AND MILLS
PLANING MILLS
POWER PLANTS
RAILROADS
ROAD BUILDERS
SAW MILLS
SHIPBUILDERS
TRACTOR REPAIR SHOPS
WOODWORKING PLANTS

Manufacturers' catalogues covering equipment mentioned above will be sent upon request.

**WE CARRY THE LARGEST STOCK
OF MACHINERY ON THE
PACIFIC COAST**

METAL WORKING LATHES

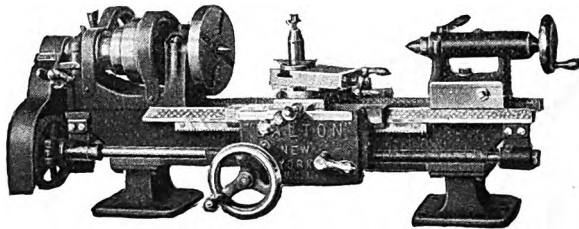


FIG. 5139

ADAMS "SHORT-CUT"

FOR QUANTITY PRODUCTION OF SHORT DUPLICATE PARTS

Designed for rapidly turning large or small quantities of duplicate parts on a strictly manufacturing basis. The large amount of work which can be placed on a machine of this type will be self evident after a survey of parts made in any manufacturing plant. In many plants the percentage of work 4 inches and under in diameter and less than 15 inches in length will amount to nearly 90 per cent of the lathe work produced.

When asking for prices send samples or blueprints of parts to be turned.

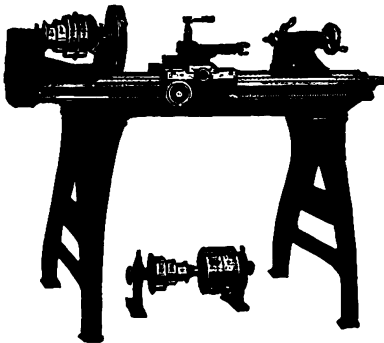


FIG. 5072

CARROLL-JAMIESON

13-INCH BACK GEARED

Designed especially to meet the requirements of garages and general repair shops, with automatic longitude and cross feeds.

Swings $13\frac{1}{4}$ inches over bed and can be furnished with beds in $5\frac{1}{2}$, $7\frac{1}{2}$ and 10-foot lengths.

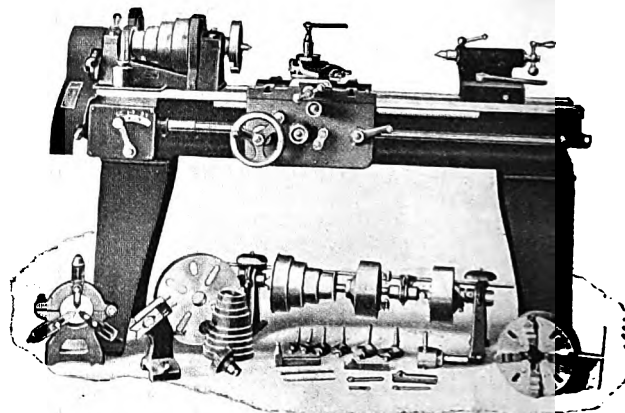


FIG. 5073

"DALTON SIX"

This is a powerful little machine that will save your large lathe for large work. It will swing $7\frac{1}{4}$ inches over bed and can be furnished with bed 30 or 36 inches in length.

Designed especially for the finest and most accurate work required of an engine lathe. Can be furnished with or without legs and following attachments—taper attachment, follow and steady rests, draw-in attachment, chasing dial, transposing gears, internal and external grinding attachments.

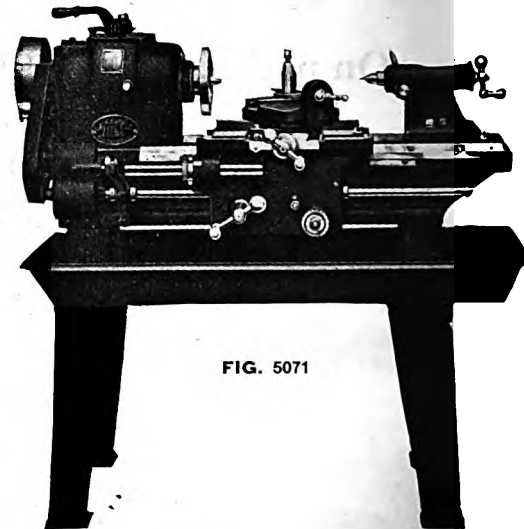


FIG. 5071

STERLING

BELT DRIVEN OR WITH FOOT POWER

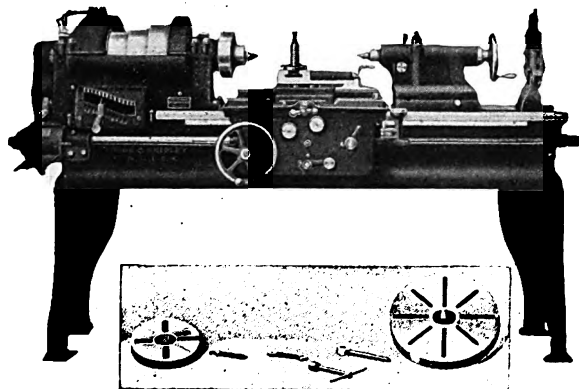
Swings $11\frac{1}{4}$ inches over bed and can be furnished either belt driven or with foot power with straight bed or gap bed in four or five foot lengths.

WE CAN ALSO FURNISH LATHE TOOLS, CHUCKS, TURRETS, MILLING ATTACHMENTS, TAPER ATTACHMENTS, TOOL POST AND ALL OTHER LATHE ATTACHMENTS AND EXTRAS. SEPARATE CATALOGUES ON LATHES FURNISHED UPON REQUEST.

METAL WORKING LATHES**LODGE & SHIPLEY****THREE STEP CONE HEAD TYPE**

Made in sizes 14 to 60-inch Swing.
Any length of bed.

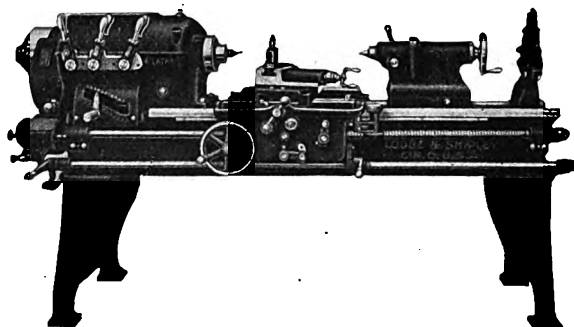
All lathes can be equipped with Taper Attachment, Relieving Attachment and Draw-In Chucks for Tool Room work, with Turret on Carriage or Turret on Bed for Chucking Work. The manufacturing lathe is made with length and diameter stops, connected compound and rear rest, four-way tool block, high duty tool block, pan, pump and tubing. Special gang tool blocks can be furnished when desired.

**FIG. 3500****SELECTIVE HEAD (ALL GEARED) TYPE**

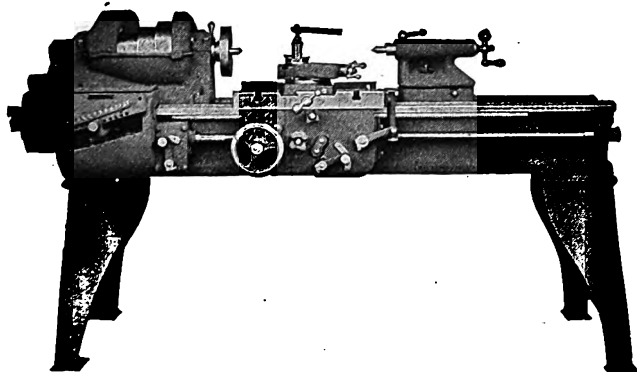
Made in sizes 14 to 60-inch Swing.
Any length of bed with or without oil pan.

The "Selective" Head Lathe is an all-g geared machine in which any one of the spindle speeds may be selected instantly. It combines strength, simplicity and durability.

Can be furnished with or without oil pan.

**FIG. 3501****CARROLL-JAMIESON****14-INCH QUICK CHANGE GEAR**

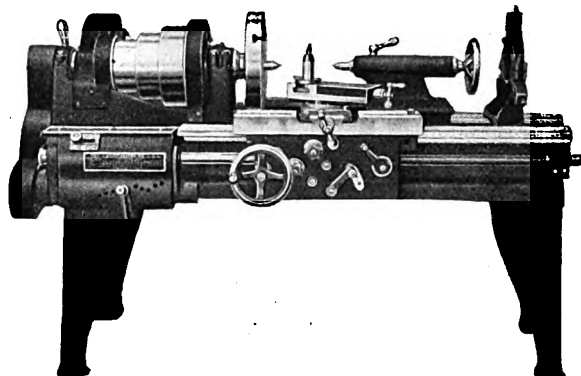
Swings $15\frac{1}{4}$ inches over bed and can be furnished with either single or double back gears with any length of bed.

**FIG. 5074****FAY & SCOTT****STANDARD BED**

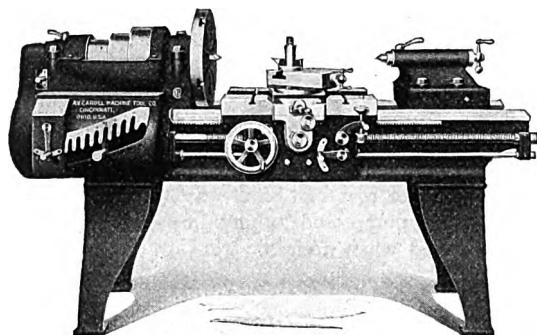
Made in Sizes 14 to 48-Inch.
Any Length of Bed.

GAP BED

Made in Sizes 14-Inch-28-Inch to 38-Inch-66-Inch.
Any Length of Bed.

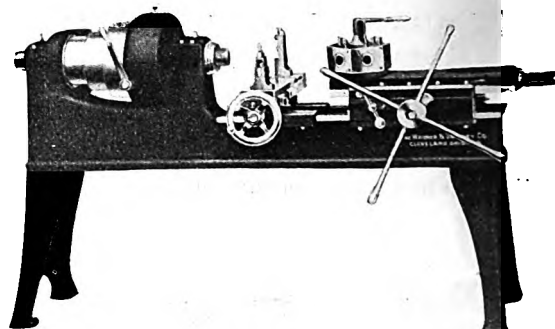
**FIG. 3504**

WE CAN ALSO FURNISH LATHE TOOLS, CHUCKS, TURRETS, MILLING ATTACHMENTS, TAPER ATTACHMENTS, TOOL POST AND ALL OTHER LATHE ATTACHMENTS AND EXTRAS.
SEPARATE CATALOGUES ON LATHES FURNISHED UPON REQUEST.

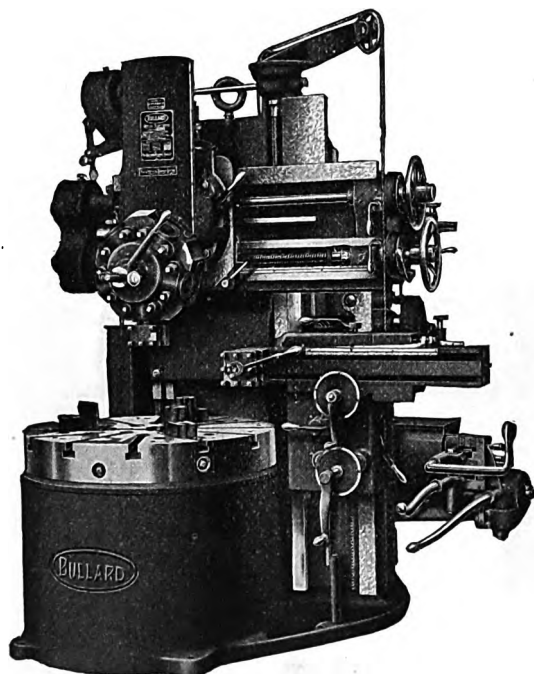
METAL WORKING LATHES**CARROLL 16-INCH****FIG. 5075**

Swings 18 inches over bed, and can be furnished with bed of any length.

Standard equipment includes quick change gears and double back gears.

TURRET**FIG. 3507**

This cut illustrates but one of the various types of turret lathes that we can furnish. We can furnish turret lathes for bar and chucking work of all kinds in brass foundries and other shops having use for a machine of this kind.

THE BULLARD VERTICAL TURRET**FIG. 3509****NEW ERA TYPE**

FOUR SIZES: 24, 36, 42 AND 54-INCH

Can be supplied with either 3-Jaw Combination or 4-Jaw Independent Chuck built into table. Cutting Coolant System, Thread Cutting Attachment and either Universal or Plate Type Forming Attachments can be applied when specified.

WE CAN ALSO FURNISH LATHE TOOLS, CHUCKS, TURRETS, MILLING ATTACHMENTS, TAPER ATTACHMENTS, TOOL POST AND ALL OTHER LATHE ATTACHMENTS AND EXTRAS. SEPARATE CATALOGUES ON LATHES FURNISHED UPON REQUEST.

UPRIGHT DRILLS

LINDGREN HIGH SPEED

20-INCH ALL GEARED

This is a silent running and very powerful machine, having sufficient power to pull a 1½-inch drill through steel, with .0012 feed.

This Drill has 5 speeds without back gears. All bearings in speed-box have ring oilers. The spindle is equipped with ball thrust bearings, the nose of which is extended to bring the drift hole below the sleeve. The sleeve is graduated in inches.

Equipped with positive gear feed, having four changes, and automatic stop. The feed can be changed while the machine is in operation. Is fitted with star handle.

FIG. 3513

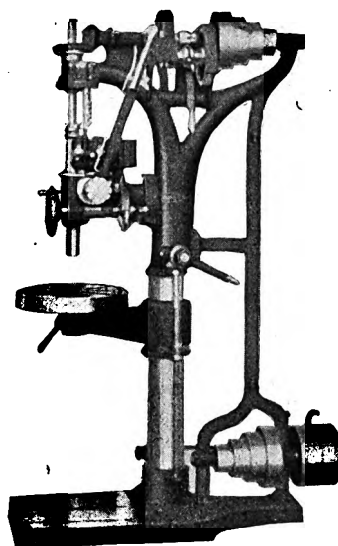


FIG. 3512

SUPERIOR

SEVEN SIZES: 20 TO 36-INCH BELT OR MOTOR DRIVEN

Furnished with a Round or Square Table and with or without Tapping Attachment.

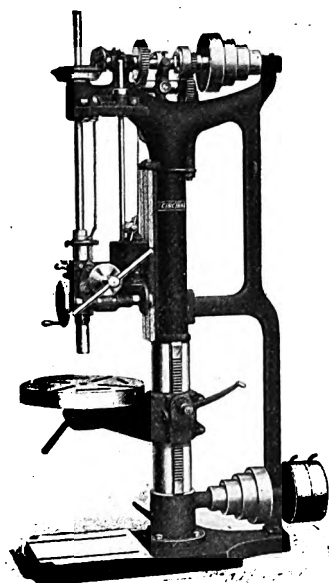


FIG. 3511

CINCINNATI

SEVEN SIZES: 20 TO 42-INCH BELT OR MOTOR DRIVEN

Made in seven sizes, ranging from 20 to 42 inches, each of which is furnished with a round or square table and with or without tapping attachment.

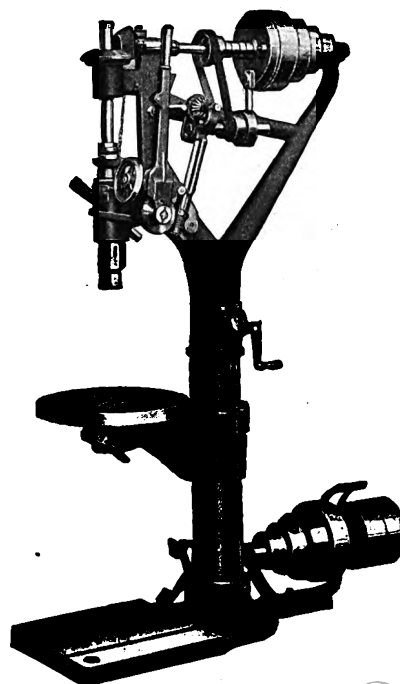


FIG. 3510

SILVER

20-INCH DRILLS

Four styles: Plain Lever Feed, Combined Lever and Wheel Feed, Power Feed and Automatic Stop and with back-gearing. Each style is made with either round or square base.

20-INCH SWING GANG DRILLS

Can be furnished in gangs of two, three and four spindles.

RADIAL DRILLS

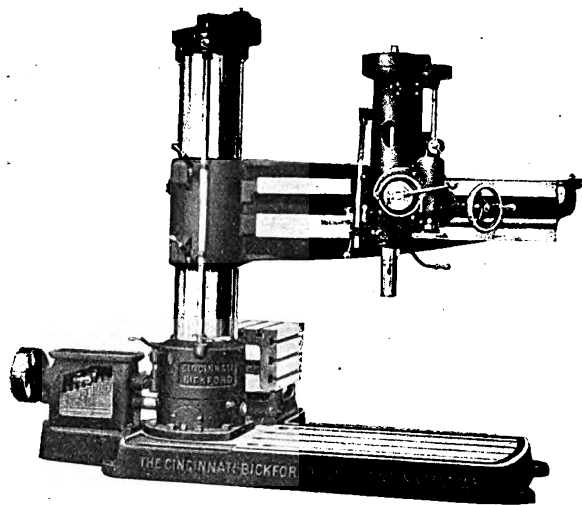


FIG. 3514

"WISCONSIN" HIGH SPEED

This machine is intended for rapid drilling and tapping of holes up to $\frac{3}{4}$ inch in diameter.

It is furnished in 3-foot or 4-foot size, with plain base and plain table; with tee slot base and plain table; with tee slot base and swinging table; with cone drive or four speed gear box drive; with A.C. or D.C. motor drive; direct connected, no belts.

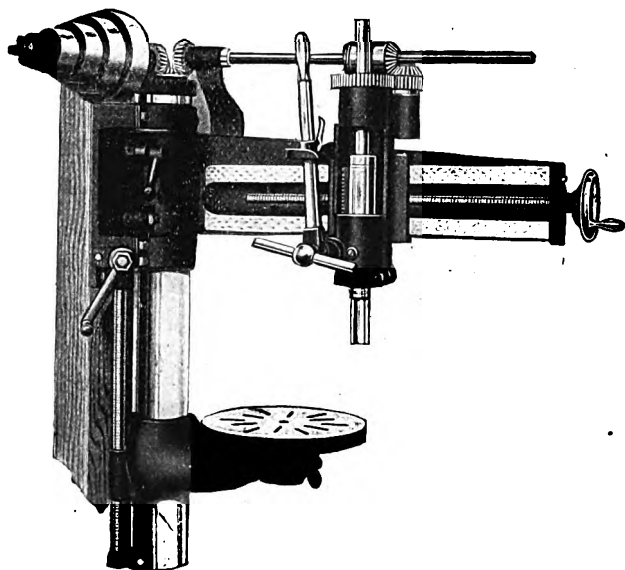


FIG. 3516

CINCINNATI BICKFORD

MADE IN TWO TYPES: PLAIN AND UNIVERSAL

The arms on the plain radials range from $2\frac{1}{2}$ to 6 feet, while those on the Universal ones have a reach of 4, 5 and 6 feet. Each is furnished with at least two styles of tables and four styles of drives. The feeds in the tool illustrated are 6, 10, 15 and 20 thousandths; in the 4, 5 and 6 foot plain radials, 6, 9, 13, 18 and 24 thousandths, and in the 4, 5 and 6 foot Universal radials, 7, 9, 12, 16, 20, 26, 34 and 43 thousandths, per revolution.

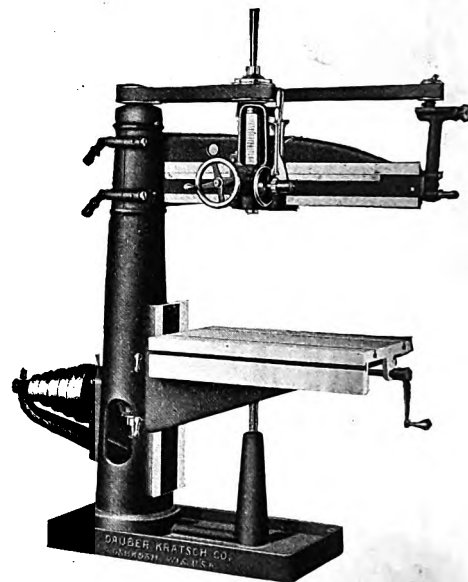


FIG. 5076

WALL OR POST

NOS. 50 & 51

Furnished with $2\frac{1}{2}$ ft. or $3\frac{1}{2}$ ft. arm. Machine with $2\frac{1}{2}$ ft. arm drills to center of circle outside of column 64 inches; with $3\frac{1}{2}$ ft. arm 84 inches. Greatest distance of spindle to table 18 inches.

No. 51 Machine is equipped with Quick Return Lever, four changes of feed, and Automatic Cut-Off.

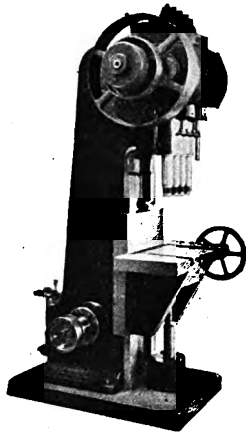


FIG. 3519

BAKER CYLINDER BORING MACHINES

TWO SPINDLE, FOUR SPINDLE AND SIX SPINDLE NOS. 3, 4 AND 5.

These machines are rated to bore cylinders to 6" diameter by 14" long. The spindles on the Nos. 4 and 6 Borers have fixed center distances which can be made to suit customers' requirements. The spindles on the No. 3 Borer are adjustable, giving centers from 4½" to 8".

Machines are especially well adapted to boring of automobile cylinders, where same are cast in block.

Machines can be arranged for motor drive, belting from a motor placed on an extended base and belting up.

BAKER HIGH SPEED DRILL

This machine is designed for rapid boring, drilling, forming and facing and all work of like nature.

Made in five sizes suitable for High Speed Drills up to 2 inch, 3-inch, 4-inch, 4½-inch and 5-inch.

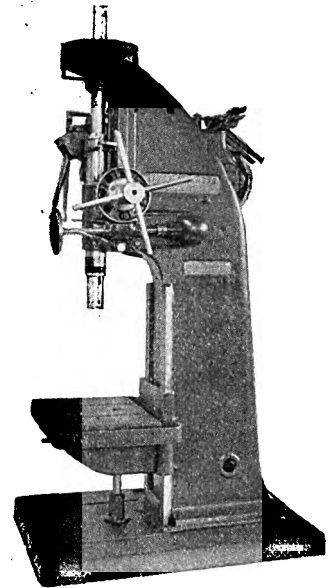


FIG. 3515

THE BULLARD MAXI-MILL

MADE IN THREE SIZES: 44, 54 AND 61 INCHES

A development of the maximum possibilities of the Vertical Boring and Turning Mill based upon a knowledge of the requirements gained by extensive observation and a specialized experience as makers and users thereof.

A machine tool of extreme power having weight, rigidity and materials of construction to withstand the most severe usage continuously with a minimum of maintenance cost, and operative features of proven value in the reduction of production cost by the "elimination of wasted time."

Can be furnished with plain table with parallel "T" slots for face plate jaws or with three-jaw combination or four-jaw independent chuck; belted or motor drive and with thread cutting attachment for cutting lubricant system.

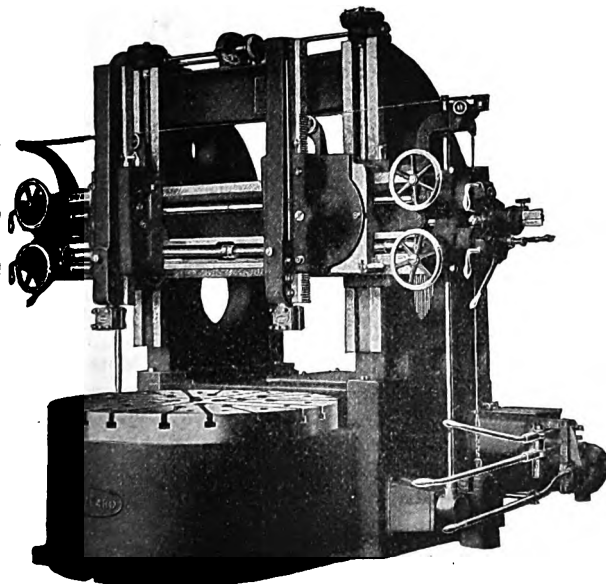


FIG. 5077

THE LANDIS BORING, DRILLING AND MILLING MACHINES

HORIZONTAL FLOOR TYPE

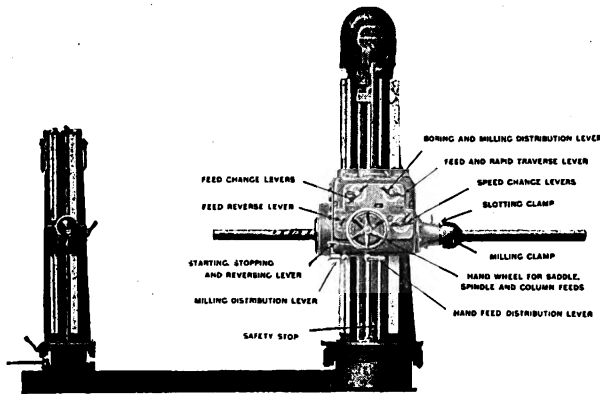


FIG. 3517

All machines are motor-driven with Constant Speed Horizontal Motor mounted on the top of the column.

The Spindle is 4 inches in diameter and regularly fitted with a No. 5 Morse Taper hole. This, however, can be increased to a No. 6. The floor plate regularly furnished with the machine is 6 ft. by 9 ft. This can be increased to suit requirements at additional cost.

All extras such as Universal Tilting and Rotating Table, Square Table, Work Table and Square Table with Revolving Table, Spacing Heads, etc. can be secured with this machine.

UNIVERSAL (HORIZONTAL) BORING MACHINES

Made in two sizes: With 3 and 3½-inch Boring Bars. Rigid construction, compact design and convenience of operation. Especially adapted for boring jigs, for facing and milling, for cylinder boring, experimental work and other work where accuracy is the first consideration.

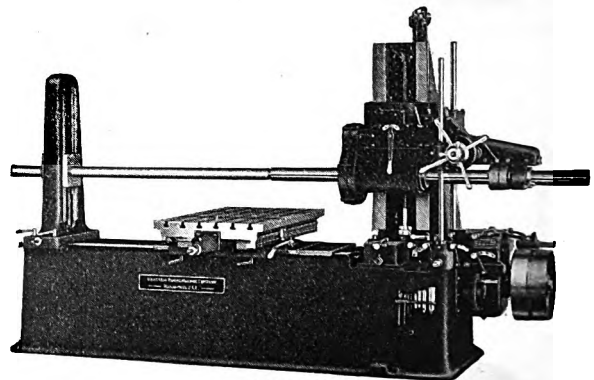


FIG. 3518

LAPOINTE BROACHING MACHINES

Made in four sizes. All can be arranged for Motor Drive. The range of work which can be performed most economically by Broaching is constantly widening. Keyways, spiral grooves and square or irregular holes of all kinds are quickly and accurately cut—irrespective of the skill of the operator—accuracy being automatic with Lapointe Broaches and Lapointe Broaching Machines.

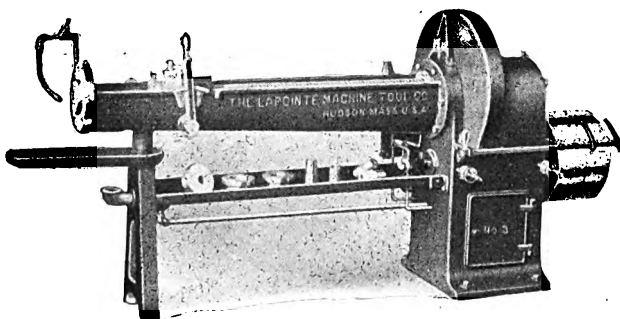


FIG. 3527

CINCINNATI MILLERS

Cincinnati Millers are built in many sizes and types to meet all requirements as found in Manual Training Schools, Experimental Shops, Garages, Shops manufacturing Small Parts in large quantities, Railroad and Ship Yard Machine Shops, Tool-rooms and Manufacturers of Large Equipment such as Gas Engines.

THE 18-INCH PLAIN MANUFACTURING CINCINNATI MILLER

Is a simple manufacturing machine of the Column and Knee type, designed for the rapid production of small parts such as are used in the construction of Rifles, Adding Machines, Registering Machines, etc.

THE 18-INCH AND 36-INCH AUTOMATIC CINCINNATI MILLER

Can be obtained either Plain or Duplex. Wherever duplicate parts are made in large quantities these machines will reduce the operation to an absolute routine.

THE NO. 1M AND NO. 2M MACHINES, CONSTANT SPEED DRIVE

Are designed for a general line of light manufacturing where the cutting is of such nature that great spindle power is not required. These machines can be obtained in either Plain, Universal, or Vertical Type.

THE NO. 3 AND NO. 4 CONE DRIVEN CINCINNATI MILLERS

Are built in Plain and Universal types. They are designed for that class of work which requires the range of a large machine but does not need the tremendous cutting capacity of the Single Pulley, High Powered Miller.

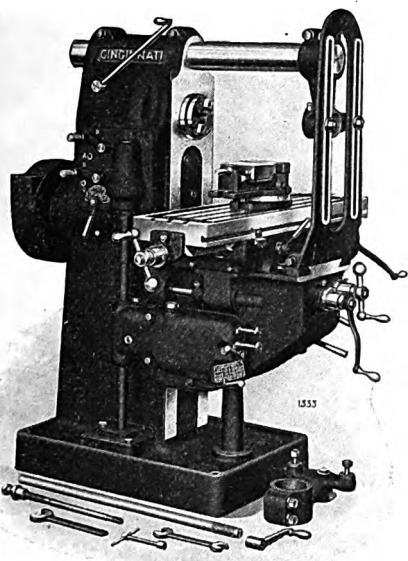


FIG. 5140
NOS. 1M AND 2M PLAIN MILLERS

HIGH POWERED MILLERS

Are built in four sizes, namely, the No. 2, No. 3, No. 4 and No. 5, both Plain and Universal. The tremendous spindle power due to the large Driving Pulleys and high efficiency of the spindle gearing, combined with special features of handiness, adapt Cincinnati High Powered Universal Millers not only to the heavier classes of tool making and repair work but also to the lighter classes of milling.

Cincinnati Vertical High Powered Millers can be obtained in either the No. 2, No. 3, or No. 4 sizes. These machines are designed for the heavier classes of milling. They have features of handiness which also adapt them for lighter work. They do not have that clumsiness in operation which so often characterizes the larger machines.

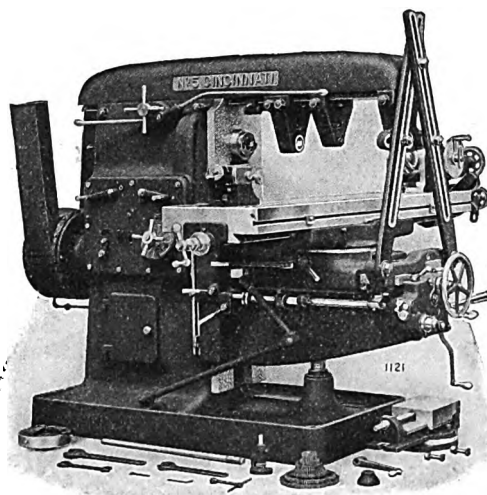


FIG. 5078
NO. 5 UNIVERSAL HIGH-POWER MILLER

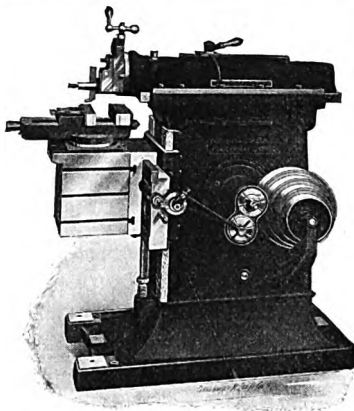


FIG. 3543

SMITH & MILLS CRANK AND GEARED SHAPERS

BELT OR MOTOR DRIVEN

Crank and Geared Shapers are the latest type, having all important improvements. Heavy, powerful, strong and substantial.

Made in sizes:

12, 14 and 16-inch Plain Crank and With Speed Box.

16, 20, 25 and 28-inch Back Geared Crank High Speed.

28-inch All Geared and Triple Geared.

32-inch Triple Geared.

BURR PORTABLE SHAFT KEYSEATERS

These tools are invaluable in repair, alteration and erection work and they are in use by the very best mills, mines, refineries and factories of every description, all over the world. No mill repair shop is complete without one of them. Keyseats may be cut at the noon hour in many cases and delays and shut-downs prevented. Alterations may be quickly made and often the machine will more than pay for itself on the first job.

Made in three sizes: No. 1 for shafts up to 5 inches, No. 2 up to 8 inches and No. 3 up to 12 inches.

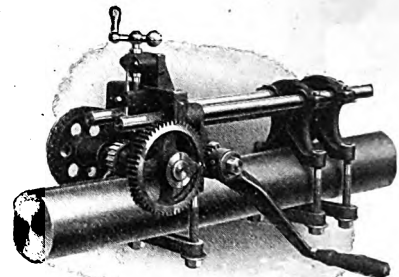


FIG. 192

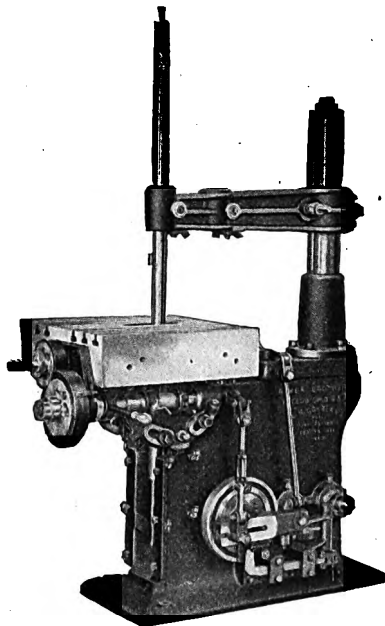


FIG. 3526

LEA SIMPLEX COLD CUTTING-OFF SAWS

BELTED OR MOTOR DRIVEN

Four sizes with blade diameters from 15 to 24 inches enable the Lea-Simplex to meet every manufacturing demand, cutting rounds up to 10½ inches, squares up to 9¼ inches, flats and structural shapes equivalent to 18 inch I-Beams.

BAKER KEYSEATER

Will cut a keyseat up to 18 inches long by 2 inches wide in a solid hub and in chambered or double hubs it will cut a keyseat 24 inches long. Work weighing up to 10,000 pounds can be easily keyseated on this machine by supporting part of the weight by a Crane. Work up to 48 inches in diameter can be chucked with the column in the outside position and by changing the column, any diameter can be handled. The largest cutterbar used on this machine is 1½-inch.

We can furnish these machines in sizes that will handle work from the very lightest up to the heaviest.

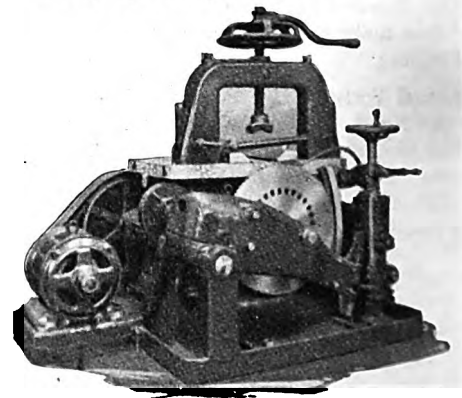


FIG. 3528

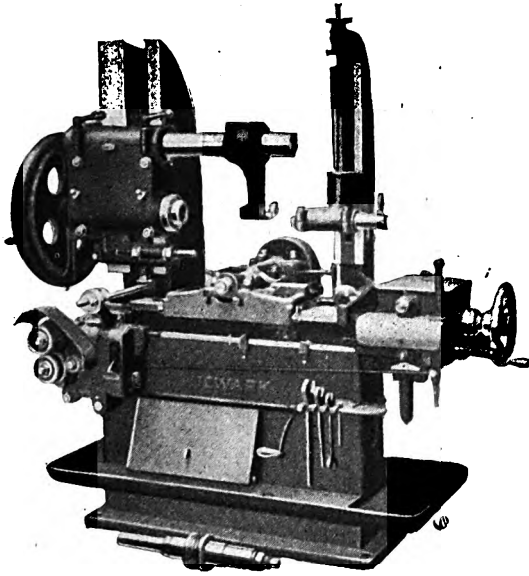


FIG. 3525

NEWARK AUTOMATIC GEAR CUTTING MACHINES

BELT OR MOTOR DRIVE

For Cutting Gears 24-inch Diameter, 6-inch face to 84-inch diameter, 24 inch face.

Also for cutting Sprockets, Ratchet Wheels, Circular Saw Teeth and other similar work.

FARWELL GEAR HOBBERS

The Nos. 1 and 3 are plain machines, capable of cutting spur gears, worm wheels, sprockets and ratchets, and will also spline shafts and gash milling cutters and reamers. The No. 1 will cut gears up to 14 inches in diameter, and the No. 3 has a capacity for gears up to 36 inches in diameter.

The Nos. 2 and 4 are universal machines, and in addition to doing all the work within the range of the plain machines, will also cut all angles of spiral gears, and will thread-mill or hob single or multiple threaded worms. The No. 2 will cut gears up to 22 inches in diameter, and the No. 4 has a capacity for gears up to 36 inches in diameter.

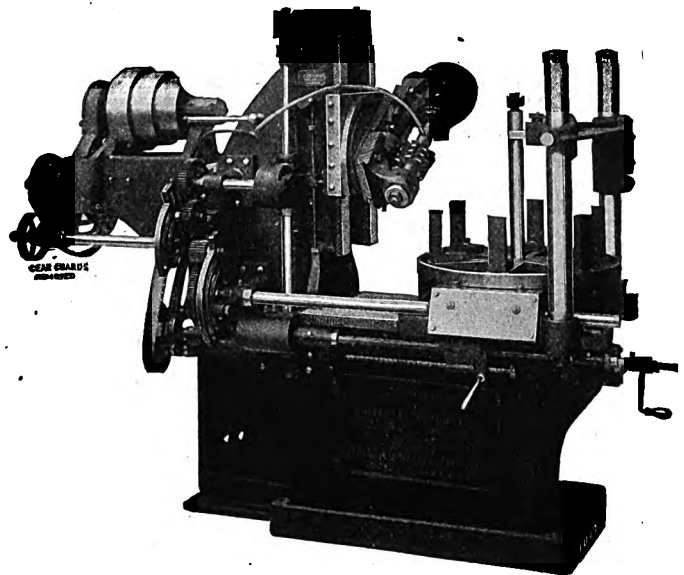


FIG. 3524

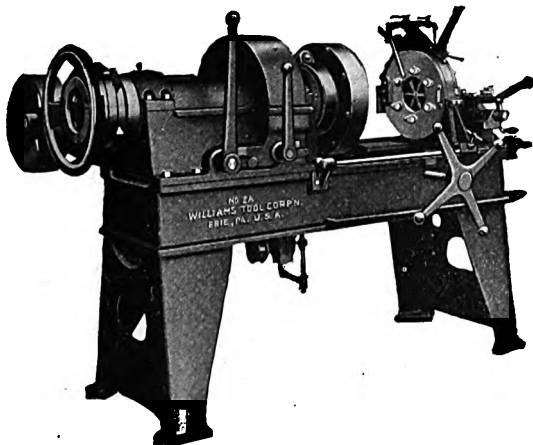


FIG. 5079

WILLIAMS PIPE, BOLT AND NIPPLE THREADING AND CUTTING MACHINES

DESIGNED TO BE DRIVEN EITHER BY BELT POWER, DIRECT-CONNECTED MOTOR, STEAM OR GAS ENGINE

Can be used for threading and cutting, pipe bolts and nipples and tapping nuts. The latest speed gear, lathe type design with stationary die head. Each machine cuts from 8 to 10 consecutive sizes, the smallest cutting as low as $\frac{1}{8}$ -inch and the largest as high as 20-inch pipe.

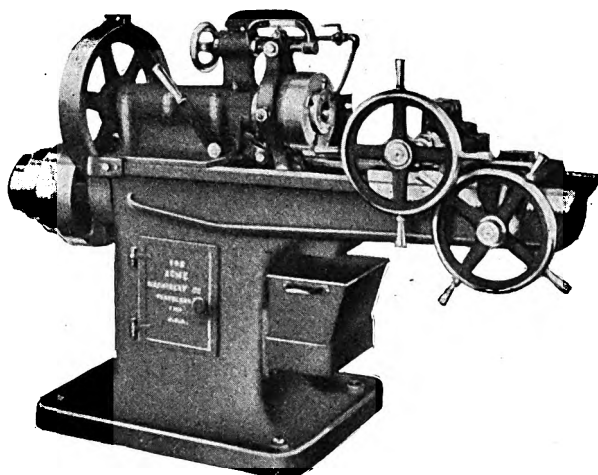


FIG. 3530

ACME TAPPING MACHINES

Acme Tapping Machines are built in two types, viz: The Hand Tapper and the Semi-Automatic Nut Tapper.

The Hand Feed Nut Tappers are built in sizes from $\frac{1}{2}$ to 2 inches with four or six spindles.

The Semi-Automatic Machines are built in $\frac{1}{2}$ to $1\frac{1}{2}$ inch sizes with six to ten spindles.

ACME BOLT CUTTERS

Acme Bolt Cutters are built in all sizes and arrangements to meet all requirements as found in all classes of machine shops. Can be obtained:

With Single Spindle with capacity from $\frac{1}{2}$ to 6 inches,

With Double Spindles from $\frac{1}{2}$ to 3 inches,

With Triple Spindles from 1 to 2 inches,

With Quadruple Spindles 1 and $1\frac{1}{2}$ inches.

Also built with long beds and with power feed for threading staybolts. Sizes from 1 to $1\frac{1}{2}$ inch Single and $1\frac{1}{2}$ inch Double.

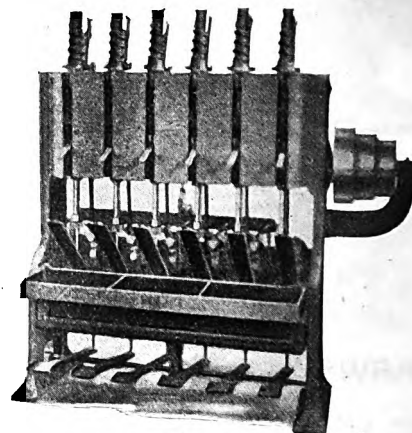


FIG. 3531

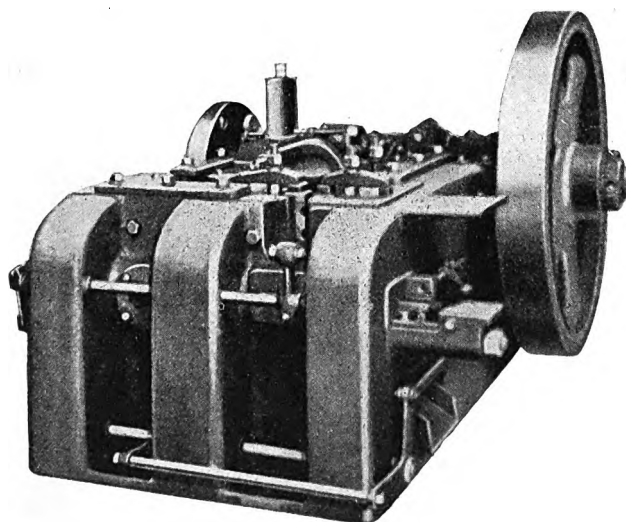


FIG. 3532

ACME HEADING, UPSETTING AND FORGING MACHINES

ALL STEEL
BUILT IN SIZES FROM $\frac{1}{4}$ TO 6-INCHES

Acme All-Steel Open Die Rivet and Track Bolt Machines are made for both hand and automatic feed in sizes from $\frac{1}{4}$ to $1\frac{1}{2}$ inch.

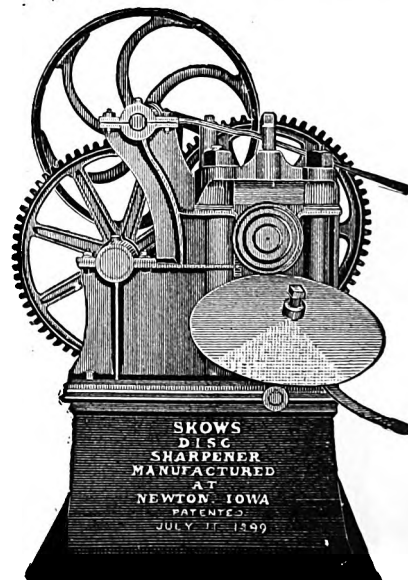


FIG. 3533

THE SKOW ROTARY DISC SHARPENER

The most practical and economical machine for sharpening discs. It does not cut the disc away, but rolls it cold, thereby increasing its diameter from $\frac{1}{4}$ to $\frac{1}{2}$ inch. The larger 24, 26 and 28-inch discs, made larger in proportion.

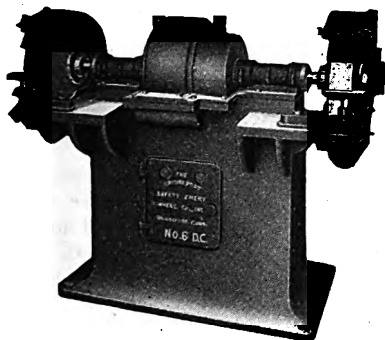


FIG. 3537

BRIDGEPORT ELECTRIC GRINDERS

Made especially for Foundries, Shipyards and large Machine Shops where the greatest rigidity is required. These machines are wound either for Direct or Alternating Current, in sizes from 10 to 24-inch Wheel. The machines are fitted with motors of special design to meet the heavy requirements for which they are built.

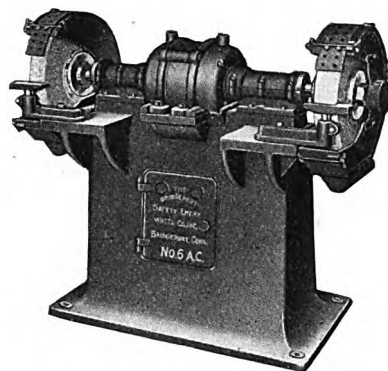


FIG. 3538

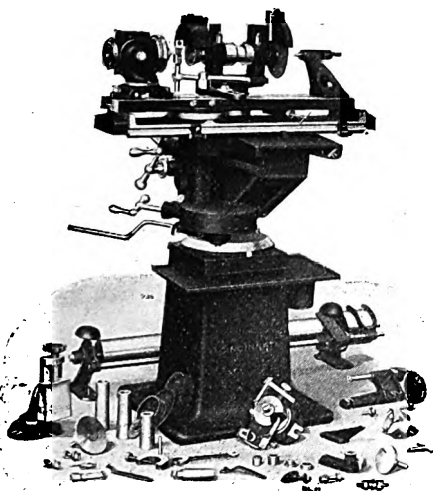


FIG. 3539

CINCINNATI CUTTER AND TOOL GRINDER

PLAIN AND UNIVERSAL

This machine is intended for the tool room. It will grind any standard shape or style of milling cutter anywhere that a cutter is ground, i. e., it will grind the hole to size, grind the faces parallel, grind the shanks of end mills and sharpen the teeth of all cutters. It will also sharpen and grind reamers, formed tools for turret lathes and automatic screw machines, hobs, taps, shear blades, mandrels, snap gauges, straight edges, etc.

TWIST DRILL GRINDERS

We can furnish dry and wet Twist Drill Grinders in various styles and sizes for grinding twist drills of all kinds.

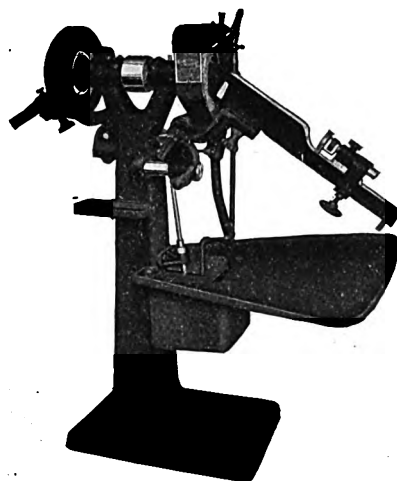


FIG. 3540

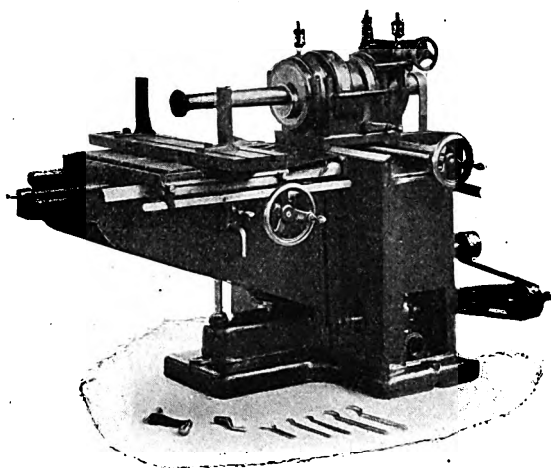


FIG. 3536

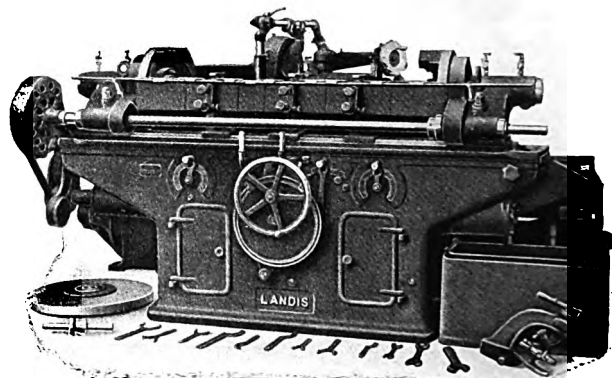
MADISON CYLINDER GRINDING MACHINE

Will handle the most irregular shaped cylinder castings. There is a wide range of vertical adjustment to the table which allows for the use of almost any type of angle plate for holding the work. The table carrying the work feeds back and forth only. The grinding head has a cross adjustment, and this provides for the moving of the grinding wheel from the alignment of one cylinder bore to that of the next.

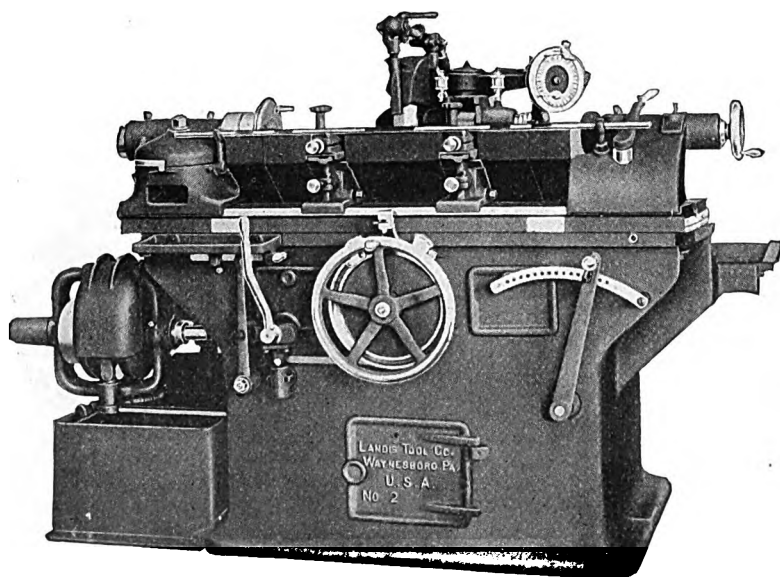
LANDIS GRINDERS

CAN BE OBTAINED IN ALL SIZES, PLAIN, UNIVERSAL, INTERNAL AND CRANK

The plain and the crank grinders are self-contained. When the machines are belt-driven, there is but one belt from the countershaft. When the machines are motor driven there is no countershaft needed, for the entire drive is within the machine. The Universal and internal grinders have the overhead drive for both the wheel and the work.



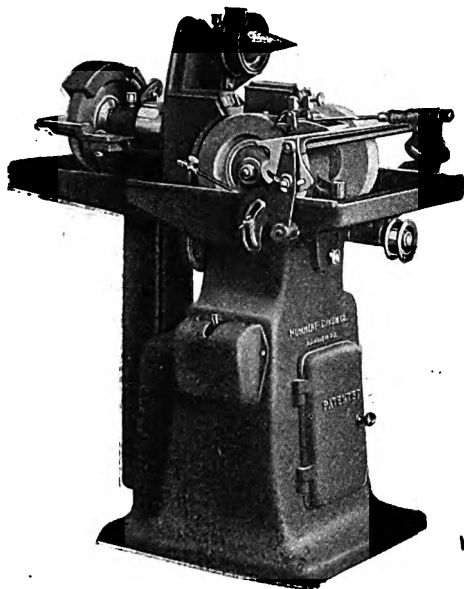
CRANK SHAFT GRINDER—FIG. 5080



NO. 2 UNIVERSAL GRINDER—FIG. 3534

The crank grinder is not a plain grinder adapted to crank grinding, but is a machine designed particularly for crank grinding. The heads are specially designed for giving the throw.

On all Landis machines the wheel has the longitudinal travel instead of the work having the longitudinal travel. The Landis method has proven more satisfactory, for it is possible to have work more rigidly supported without increasing the floor space. It also makes it possible to have controlling levers more concentrated, thereby making the machine easier to manipulate.



OILSTONE GRINDERS

Designed for sharpening edge tools, general grinding, beveling knives, etc., in Industrial Shops, Training Schools and everywhere edge-tools are used. They are economical, clean and a very desirable addition to the woodworking equipment.

BESLY GRINDERS

FIG. 3541

There are four general classes of Besly Grinders: Single Spindle, Double Spindle, Vertical Spindle and Patternmakers'. Each class may be had in a large variety of sizes and modifications as to equipment of work tables, grinding wheels, etc.

A Single Spindle Grinder brings only one grinding disc in contact with the work, grinding one side of a piece at a time.

A Double Spindle Grinder brings two grinding discs in contact with the work, grinding two parallel surfaces simultaneously.

The Vertical Spindle Grinder is not well suited for angular or size grinding, being used principally for jointing and flattening work with comparatively small area of finished surface, such as stove and furnace doors, foundry flasks, gear cases, meter cases, split shaft bearings, etc. It is especially suited for such grinding where work is too large or heavy to be conveniently handled on lever feed grinder or where a large number of pieces can be ground simultaneously by gravity feed. Small work which is too light to grind satisfactorily of its own weight can often be done to better advantage on a lever feed single spindle grinder.

Patternmakers' Grinders are made in three types, with disc wheels 30-inch or 40-inch diameter as follows: Type A, with disc wheel and work table on one end only. Type B, with disc wheel and work table on both ends. Type C, with disc wheel and work table on one end and roll sanding attachment on other end.

The disc wheel is for grinding flat surfaces and external curves. The roll sanding attachment is for grinding internal surfaces, both straight and curved. The adjustable work tables and various work table attachments, graduated, insure extreme accuracy in angularity and dimension, at trifling labor cost.

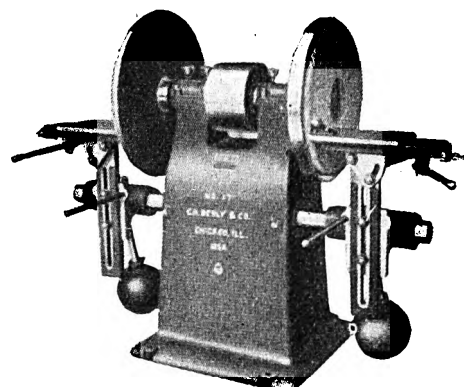
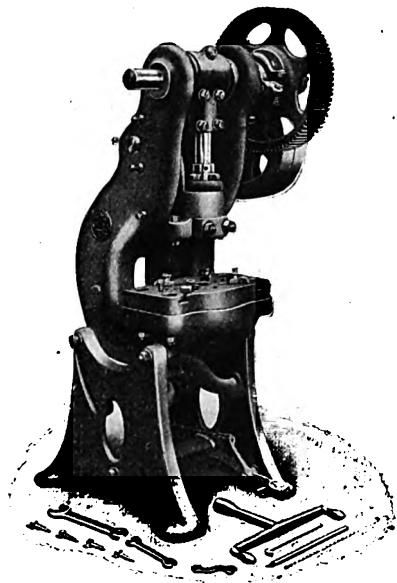


FIG. 5141

FERRACUTE POWER PRESSES

FURNISHED IN OVER 1500 SIZES AND STYLES FOR WORK OF EVERY DESCRIPTION

The CG-3 Press illustrated is the third in a Series of six Geared Cutting Presses. These Presses are also built non-geared. Both Styles are inclinable and have ample bed surface with large hole in bed and are therefore better adapted for working thin materials in large sheets than are some other types. These features adapt them for a wide range of cutting, forming and perforating work in sheet metal, leather, cloth, paper, etc.



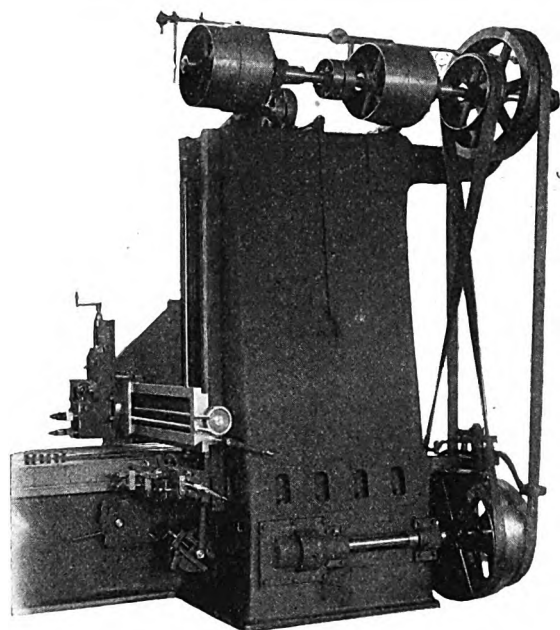


FIG. 3544

CLEVELAND OPEN SIDE PLANERS

MADE IN SEVEN SIZES: 26, 30, 36, 42, 48, 60 AND 72-INCH

Will take any cut which the tool will stand. The open side construction allows the planing of much wider work than is possible with the old style machine. All machines can be arranged for belted motor, or reversing motor drive if desired. We can also furnish supplemental rolling tables for extremely wide work. If a fourth head is demanded by part of the work, we can equip the planer with an outside demountable column.

HILLES AND JONES PUNCHES, SHEARS AND BENDING ROLLS

SINGLE, DOUBLE AND MULTIPLE

SHEARS FOR PLATES, BARS OR ANGLES—PLATE BENDING ROLLS, PLATE STRAIGHTENING ROLLS, PLATE EDGE PLANERS, NOTCHING PRESSES, BENDING MACHINES, ANGLE SHEARS.

SPECIAL TOOLS FOR SHIPYARD SERVICE

PLATE SCARFING MACHINES, HYDRAULIC JOGGING PRESSES, ANGLE BAR PLANERS, ANGLE, CHANNEL AND Z-BAR BEVELING MACHINES

PLATE SHEARING MACHINE. GUILLOTINE TYPE

This cut illustrates the Plate Shearing Machine of the Gate or Guillotine Type. A variety of different sizes is available for plates up to and including 1½ inches thickness of steel.

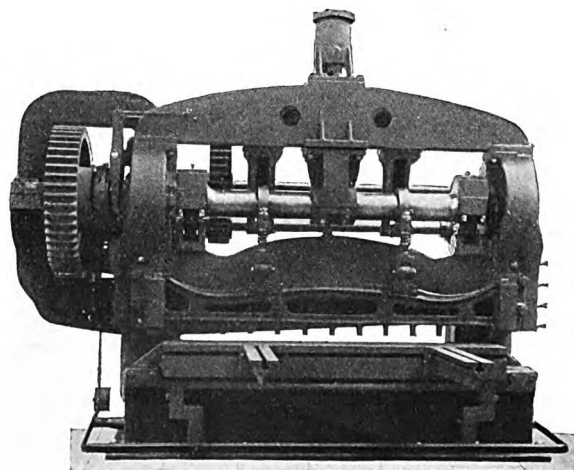


FIG. 3546

SINGLE PUNCHING OR SHEAR MACHINES

This cut illustrates one of the Standard Types of Single Punching or Shear Machines. These machines are frequently arranged with Plate Shearing Attachments which are interchangeable with the punching tools. These Vertical Punches or Shears are made in a variety of different throat depths from 5 up to 72 inches, the smallest size is rated equal to punch ¼-inch hole through ⅝-inch thickness of plate; the largest size, 5 inches diameter through 2 inches thickness. Various modifications of the jaw and other details are permissible to take care of special requirements such as structural shapes, etc.

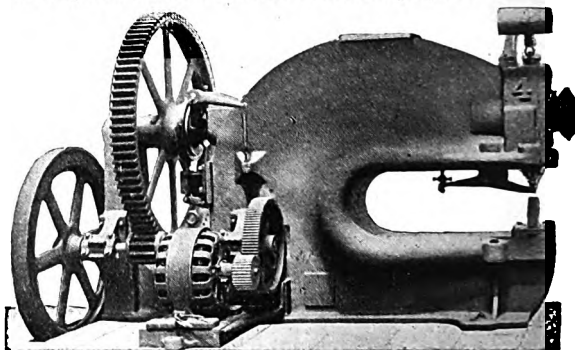


FIG. 3545

PLATE BENDING ROLLS

This cut illustrates a Standard size of Plate Bending Rolls of the Pyramid Type. These machines are built in different lengths up to 32 feet for heavy shipyard service, and a large number of medium and smaller sizes to take care of boiler and tank works, etc.



FIG. 3547

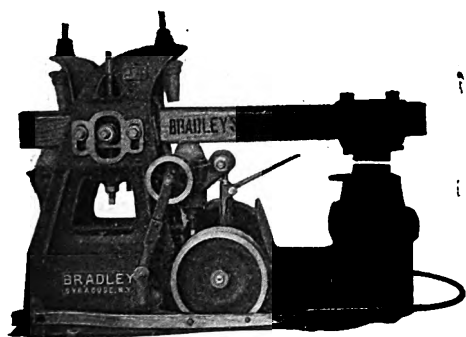


FIG. 5081

BRADLEY HAMMERS

Made in Helve, Upright Strap, Upright Helve and compact styles capable of forging iron, steel and other metals from 5 inches square down.

The Helve hammer illustrated is made with heads ranging from 15 pounds to 500 pounds, and is recommended for continuous work like plating, drawing, swaging, collaring, welding or spindle work with infrequent changes in size of material or die work where perfect accuracy and finest finish are imperative.

The Upright hammer is recommended for general all-around jobbing work with frequent variations in the size of stock. This type is made with heads ranging from 15 pounds to 200 pounds.

For all-around general work where floor space is limited, the compact hammer is recommended. This style is furnished with heads ranging from 15 pounds to 200 pounds.

STEAM HAMMERS

Standard Guide Single Frame Hammers, Steel Frame Combined Hammers, Open Frame Hammers, Double Frame Hammers and Steam Drop Hammers for all classes of work, in all capacities up to 30,000 pounds.

Illustrations, table of sizes and dimensions and full description will be furnished upon request.

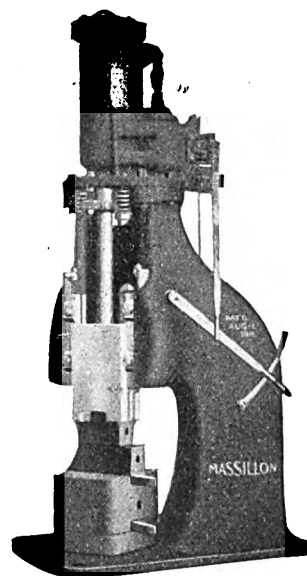


FIG. 3548

ELECTRIC TRAVELING CRANES

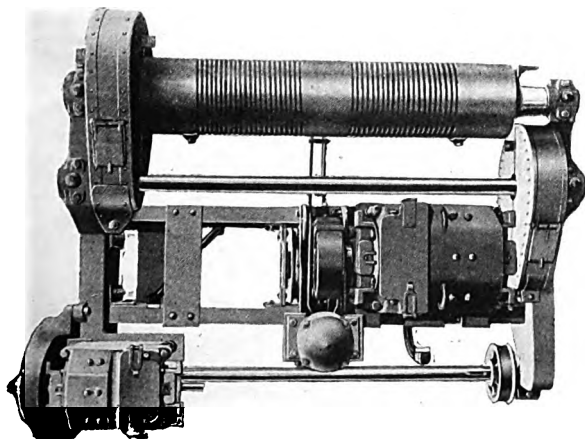


FIG. 3550

We are in position to furnish Electric Traveling Cranes of the highest quality in capacities up to 30-tons.

When sending inquiries for Cranes, the class of service for which they are to be used should be stated: i.e., whether for machine shop, boiler shop, foundry, stone-yard, power plant, or whatever the case may be. If Crane is for outdoor use, enclosed cage, if desired, should be mentioned.

In addition to the above, we should have the following data, in order to properly make up a quotation:

Capacity of Crane in tons of 2,000 lbs.

Span from center to center of runway rails.

Either the distance from top of runway rails to ground, or the maximum lift desired.

Distance from top of runway rails to lowest point of roof truss or other obstruction.

Distance from center of runway rails to side walls of building.

Capacity of auxiliary hoist, if one is required.

Voltage and type of current. (If alternating current is to be used, advise number of cycles and the phase.)

Size of runway rail.

CIRCULAR SAW MILLS

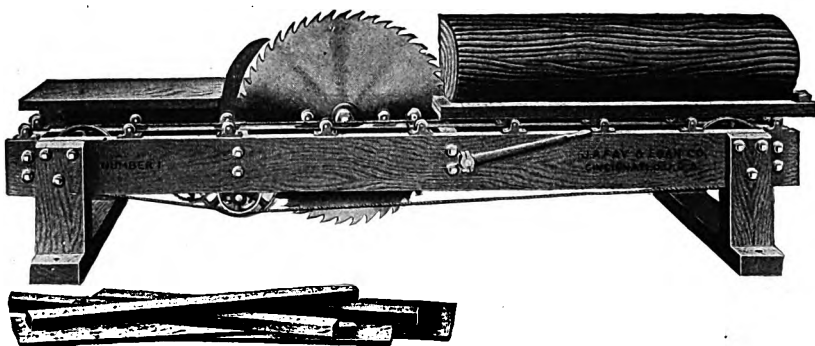


FIG. 3555

SHORT LOG

Designed for sawing short logs of medium diameter and for edging light or heavy material. Very useful in furniture factories, chair, handle and spoke factories, carriage and wagon works, etc.

Will rip 23 inches between saw and fence and will cut through 9 to 18 inches thick or up to 24 inches with 60 inch saw. Made with table to move on one or both sides of saw. Made regularly for 6½ inch material. Can be made any length desired. Feed 60-ft. a minute.

PORTABLE

Especially desirable for mines and for that class of service where it is desired to accurately manufacture small tracts of timber, the volume of which will not justify the purchase of a heavy mill. They are of the same general design and constructed with as much care as the larger and more expensive mills and not with the view of cheapness which typifies the construction of the average mill.

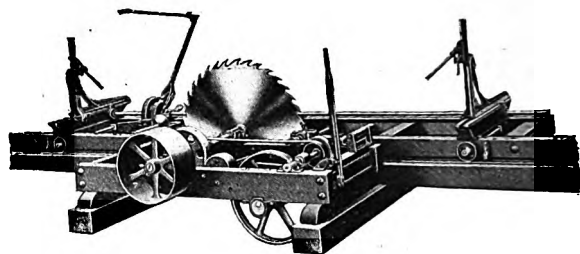


FIG. 3551

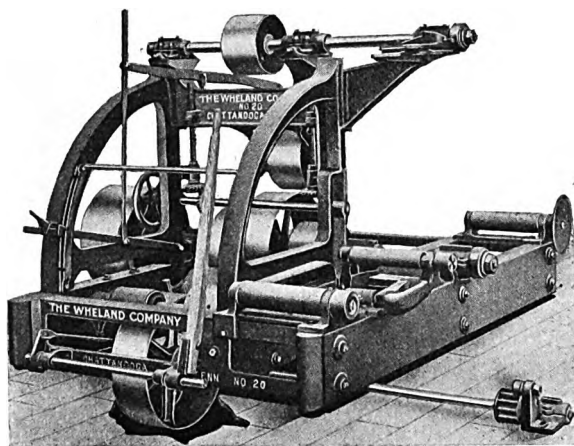


FIG. 3553

We can furnish circular saw mills for any capacity, single or double, right or left hand. We can also furnish steam feeds and independent friction feeds, air buffers and offsets, carriages and set-works for band mills and all makes of circular mills; in fact, complete equipment of the most modern machinery for a mill of any capacity, for the most economical manufacture of lumber.

SLAB RESAW

With this machine a slab 24 inches wide by 13½ inches thick can be resawed into boards from ¼ inch to 2 inches thick. Can also be used for making lath stock. Provided with lever and counterweights to instantly raise and lower the table for resawing different thicknesses. The feed works are supported from the base, therefore only the table which is counterbalanced has to be raised or lowered; the operator can easily do this with one hand on the lever. Operating levers are all within easy reach of the operator so that he has entire control of the resaw at all times.

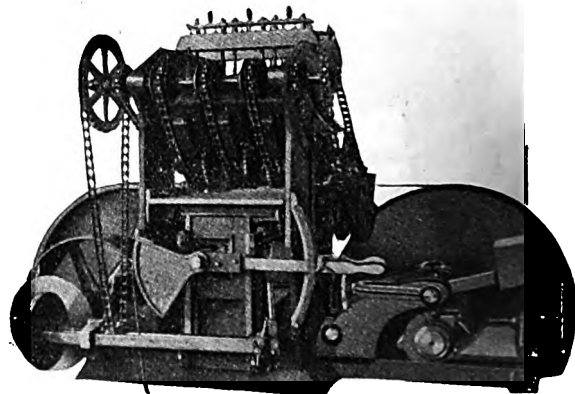


FIG. 5082

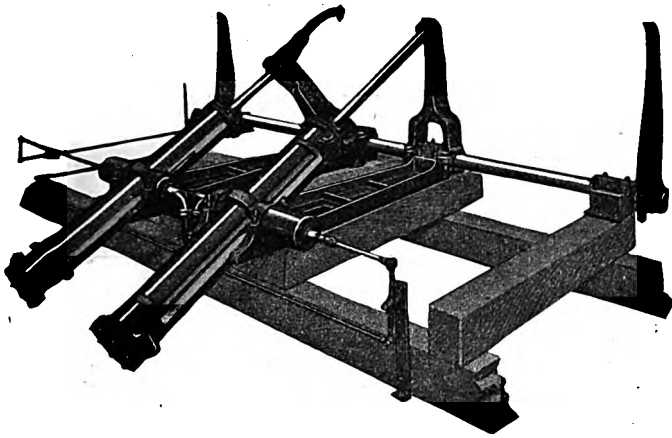


FIG. 5162

LOG TURNERS

These log turners are built in various sizes and types, having twelve inch or fourteen inch diameter bore cylinders with shafts six inches or seven inches in diameter.

Furnished in any length and with one push arm, one hook arm and with any number of helper arms.

Can also be equipped with nigger in center of push-arm.

EDGERS

EASTERN TYPE

Made in sizes from 32 inches wide and up.

When writing for information, state size and number of saws required and whether solid or inserted tooth saws are wanted.

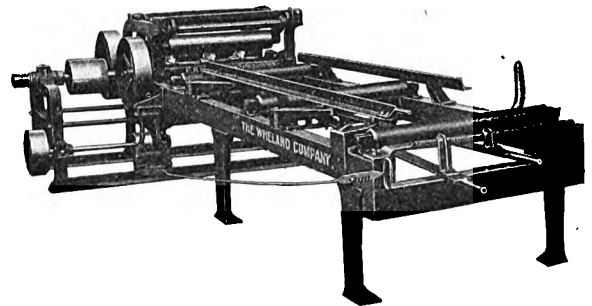


FIG. 3562

PACIFIC COAST TYPE

This type of Edger is built in three sizes to cut eight inches, ten inches or twelve inches in thickness of any desired width of lumber space and with any desired number of saws.

Can be furnished either belted or motor driven. When writing for information state size and number of saws required and whether solid or inserted tooth saws are wanted, also style of shift.

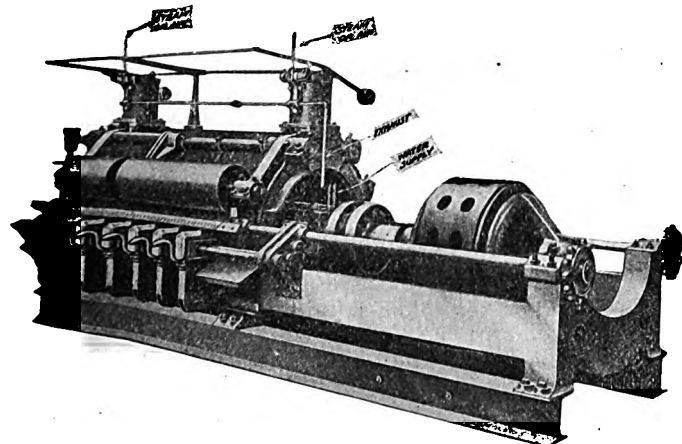


FIG. 5163

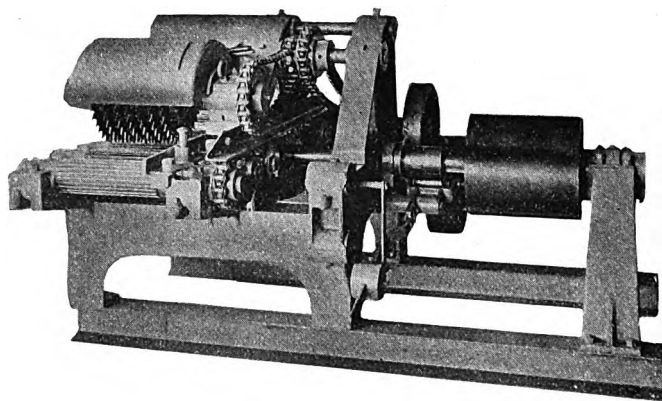


FIG. 5164

LATH BOLTER

This cut shows one type of lath bolter that we are in position to furnish. This machine can be furnished in several capacities either belted or motor driven with any number of saws up to eight.

LATH MACHINE

This type of lathe machine can be furnished in several capacities either belted or motor driven with any number of saws up to six.

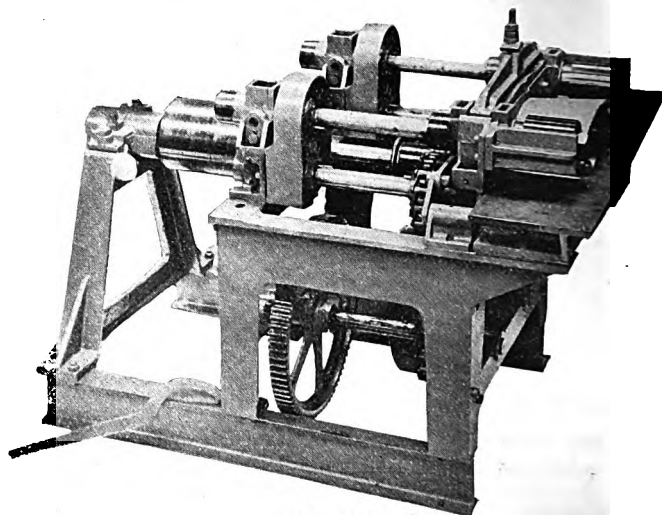


FIG. 5165

UPRIGHT SHINGLE MACHINE

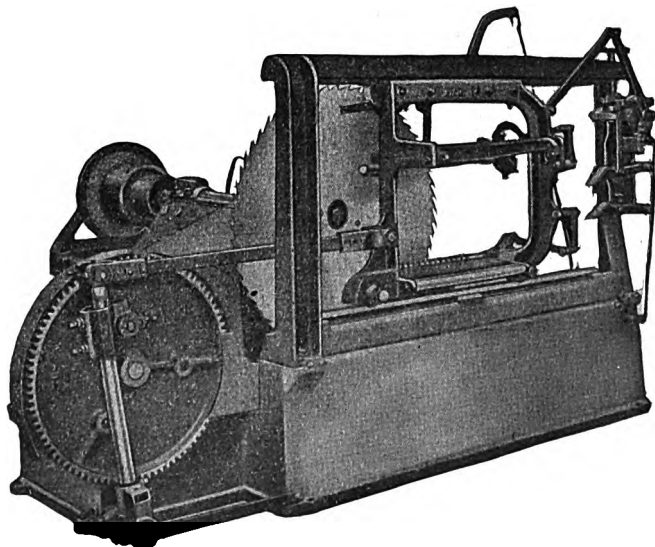


FIG. 5166

These machines can be furnished in the single type without jointing attachment or in the combination type which includes the new clipper saw for jointing either belted or motor driven. The single type machine does not include the jointing attachment and must be used in conjunction with the old type jointer.

We can also furnish shingle packers, bolters, and splitters as well as all other equipment necessary for a shingle mill of any capacity.

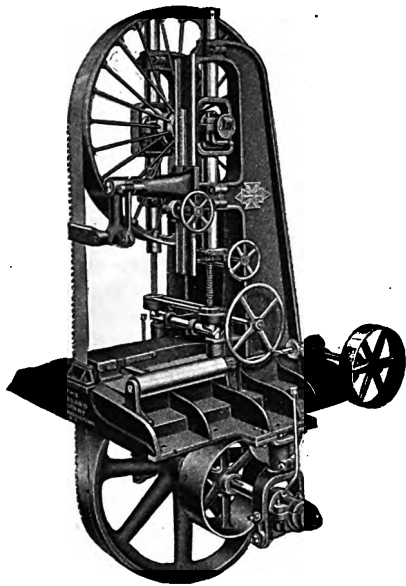


FIG. 5084

BAND SAW MILLS

This six-foot Band Mill is especially adapted for mills where a capacity of twenty to thirty thousand feet per day is desired. It will split a 48-inch circle. Carries 10-inch saws. We can furnish these mills in several sizes.

STEAM CYLINDERS

This cut shows a 6 x 12 inch cylinder designed especially for raising cast skids in a line of live rolls. We can also furnish them as small as 4 x 4½ inches and as large as any mill will require. We can also furnish log loaders, kickers, cant flippers, cast skids, automatic bumpers, etc., for live rolls, or in fact, anything required for the log deck.

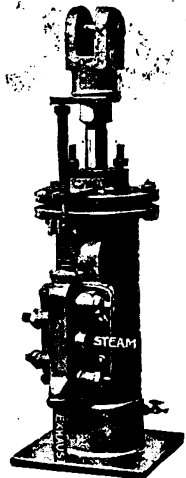


FIG. 5083

ROPE FEEDS

The rope feed illustrated is made in two sizes: drums 14 x 12 and 18 x 12 inches. We can furnish rope feeds for use with any make of mill.

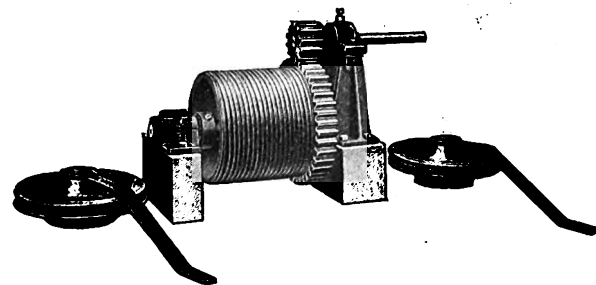


FIG. 3552

TWIN STEAM FEED ENGINES

GEARED AND DIRECT

Twin feed geared engines are built in three sizes of cylinders: 10 x 12 inches, 12 x 16 inches, and 13 x 16 inches.

Direct or straight line feed engines are built in four sizes of cylinders: 10 x 12 inches, 13 x 16 inches, 14 x 18 inches, and 16 x 18 inches.

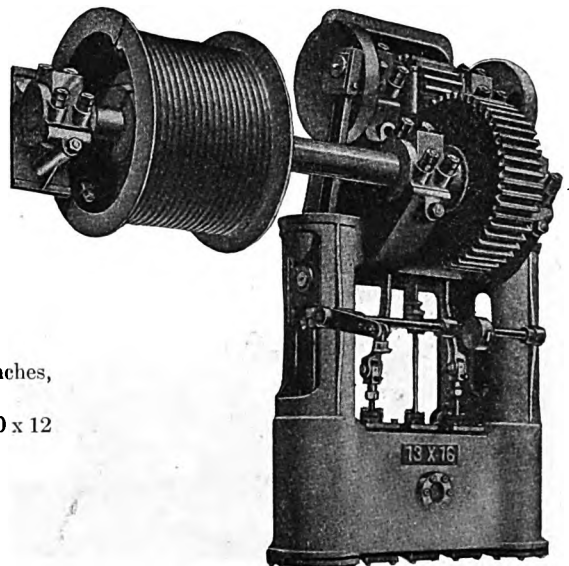


FIG. 5168

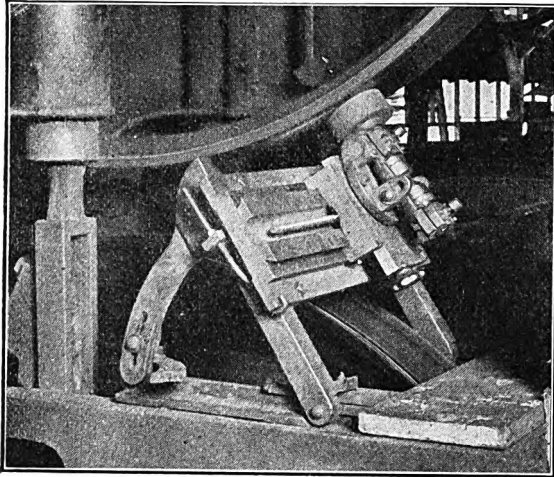


FIG. 5085

BAND WHEEL GRINDER

The only machine that is practical where band wheels are out of round, or have hard or soft places or for steel wheels. The abrasive wheel is driven by contact and requires only six to eight hours to grind a pair of band wheels. Made in one size only. Grinds feed roll band wheels without removal of feed rolls. Simple and easy to operate.

CIRCULAR RESAW

A new machine of simple and rigid construction throughout, with all gearing totally enclosed and removable iron covers. Two sizes, 24 inch to resaw up to $8\frac{1}{2}$ inches wide and to a center of 8 inches; and 30 inch to saw up to $11\frac{1}{2}$ inches wide and to the center of 8 inches; rolls self-centering or one pair may be set rigid. Feed 60 to 80 feet per minute.

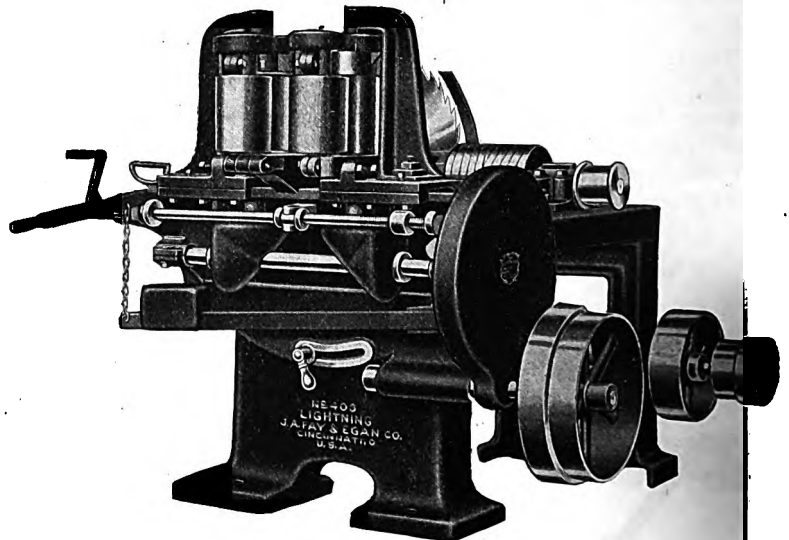


FIG. 3556

MINE TIMBER FRAMER

Does the work of a dozen timbermen and the work is more correctly and uniformly done. The joints fit better. Mine timbering is made safer. It cuts a true tenon on round, square or crooked timbers. Shafts, tunnels and stopes can be timbered in less time, less cost, and more safely with the A Mine Timber Framer. Requires just two men to run it—an operator and a helper. The position of saws can be changed for different sized tenons while running—a time saving feature.

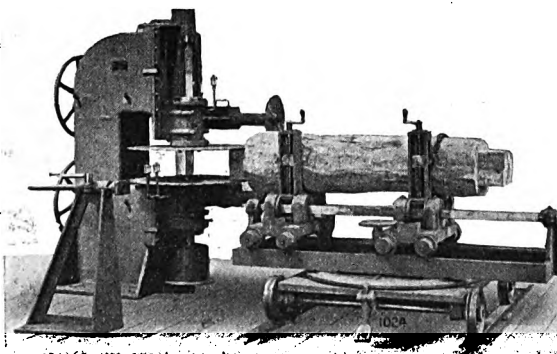


FIG. 3561

PORTABLE GASOLINE DRAG-SAWS

TWO-CYCLE ENGINE TYPE—FITTED WITH A REAL CLUTCH

For sawing logs into cordwood, shingle bolts, fuel for logging engines, clearing land, etc. One man can operate and move the machine from cut to cut on the log, while two men can pick it up and carry it over to another log. Rain or snow does not hinder its operation as there are no belts or pulleys used in its construction. The dry cells and spark coil are protected from the rain by a special metal case. Adjusts itself to any angle required, regardless of how the log lies on the ground. The capacity varies according to size of timber and location, but an average of from 15 to 20 cords of four foot wood can be cut a day. This machine, however, has cut from 25 to 35 cords in one day when logs are large and easy of access. Equipped with a real clutch located on the crankshaft—when you start the engine you do not have to turn over the whole machine.

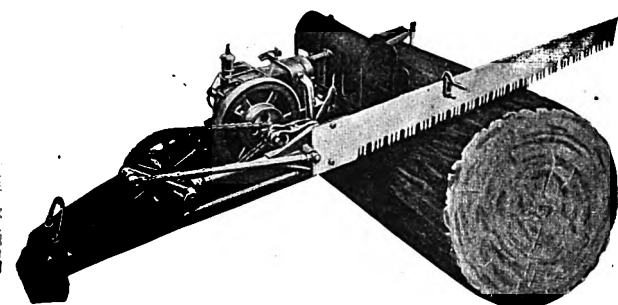


FIG. 5086

FOUR-CYCLE ENGINE TYPE—IT FELLS THEM AND SAWS THEM

This machine not only fells the trees, but also cuts them up into cord wood. It is mounted on wheels making it possible for one man to wheel it from log to log or tree to tree just as you would a wheelbarrow. It is also light enough for one man to move it from cut to cut along the log. Equipped with a hopper-cooled four-cycle gasoline engine that will easily pull 3 horsepower, and a safety friction clutch on the engine crankshaft. It is possible to cut 20 to 40 cords a day with this machine.

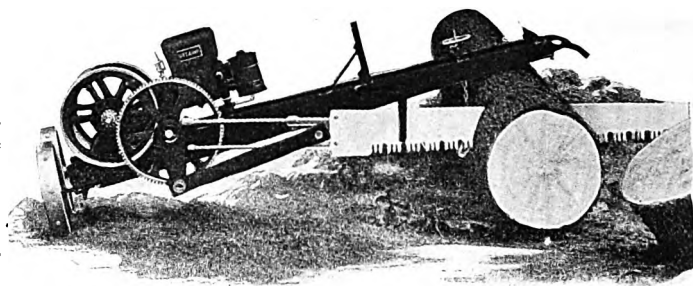


FIG. 5087

TREE FELLING ATTACHMENT

With this attachment for the saw described above it is possible to cut down standing trees. By using a telescoping rod the engine can be set at any angle and at any distance from the machine. There is no need to spend any time setting this machine, as all the setting that is necessary can be done in half a minute. This machine will fell from 35 to 65 trees a day, and will cut them off even with the ground or above the ground, leaving a stump.

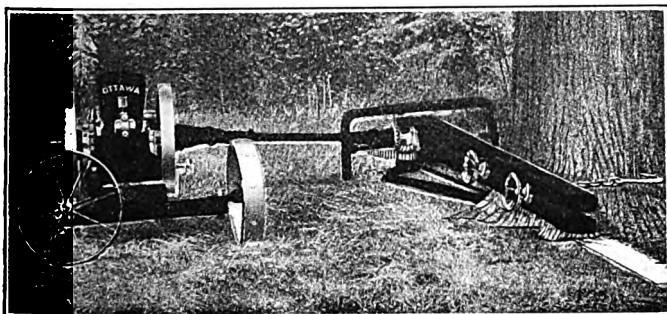


FIG. 5088

BRANCH SAW

Designed for cutting up the small branches. It uses the same power as the log saw or tree feller. You do not have to chop up the branches or have another engine and saw table to cut them.

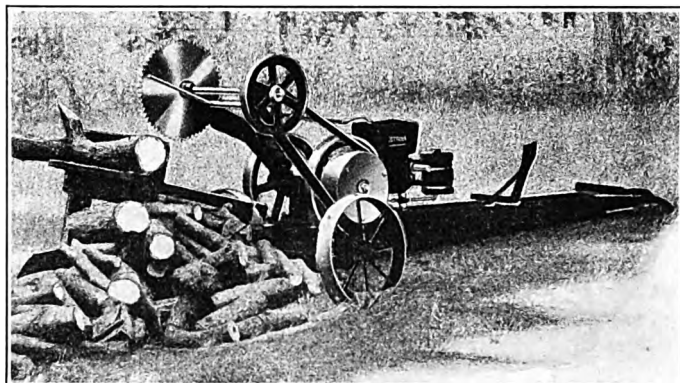


FIG. 5089

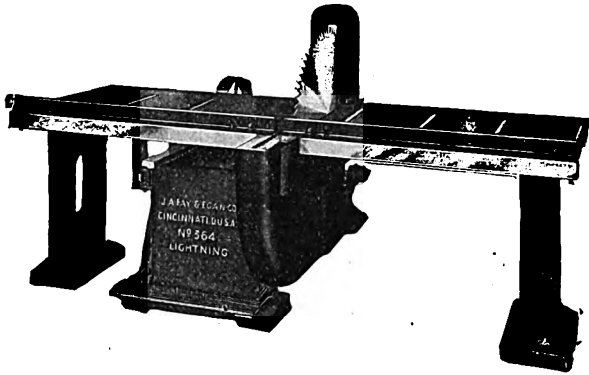


FIG. 3557

AUTOMATIC RAILWAY CUT-OFF SAW

Designed for cutting off heavy timbers in car, bridge, ship and locomotive shops, etc. An especially valuable time-saving feature is the variable stroke of saw, which in connection with the three feed rates, makes it possible to cut off all sizes of stock in the most economical manner. Can be belted from any direction or direct connected to motor. With the largest saw practical (40 inches diameter) it will cut off 16 inches wide by 13 inches thick; with the saw furnished regularly (36 inches diameter) it will cut 19 inches wide by 11 inches thick.

STEEL FRAME POLE SAW

With this style of saw frame the operator can saw short and long wood with equal facility, and can saw the longest poles into cord wood, stove wood, or any desired lengths, because the balance wheel is under the frame where it cannot interfere with the longest pole. The saw blades are guarded and any size blade from 20-inch to 30-inch diameter can be used.

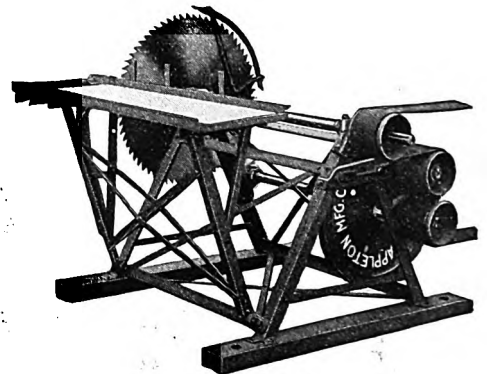


FIG. 3592

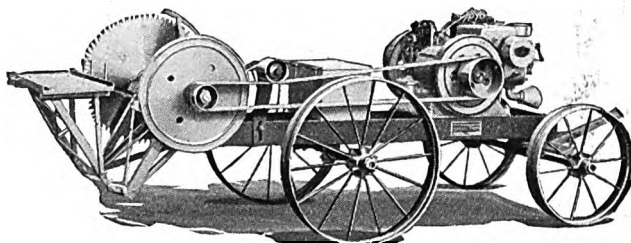


FIG. 5090

CORD WOOD SAW

This machine fills the demand for a light powerful portable saw for rough cross-cutting of old lumber or cord wood. The two cylinder 8 H.P. throttling governed kerosene engine installed on this outfit gives the saw a steadiness of motion that cannot be equalled by a single cylinder engine. Any size saw blade from 20-inch diameter to 30-inch diameter can be used—a 30-inch saw cuts 10-inch lumber. The saw blade is guarded by a steel guard.

WOOD SPLITTERS

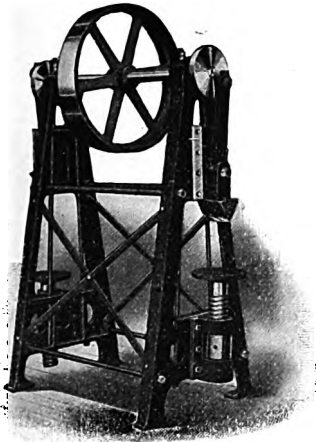


FIG. 5091

These machines are built entirely of steel and iron and are furnished either single or double. Are suitable for cutting either coarse stove wood or fine kindling and have proven very effective in knotty and hard wood which defies all efforts to split with a hand axe or wedge.

HAND POWER STUMP PULLERS

With this Stump Puller one man can outpull sixteen horses. Works by leverage—same principle as a jack. One hundred pounds pull on the lever gives a 48-ton pull on the stump. Made of the best steel. Has two speeds—60 ft. per minute for hauling in cable or for small stumps; slow speed for heavy pulls. Works equally well on hillsides or marshes where horses cannot go. Weighs 171 pounds. Easily carried or hauled on its own truck wheels.

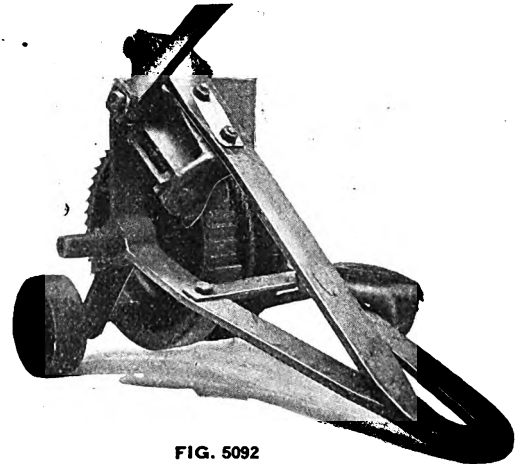


FIG. 5092

HORSE POWER STUMP AND TREE PULLERS

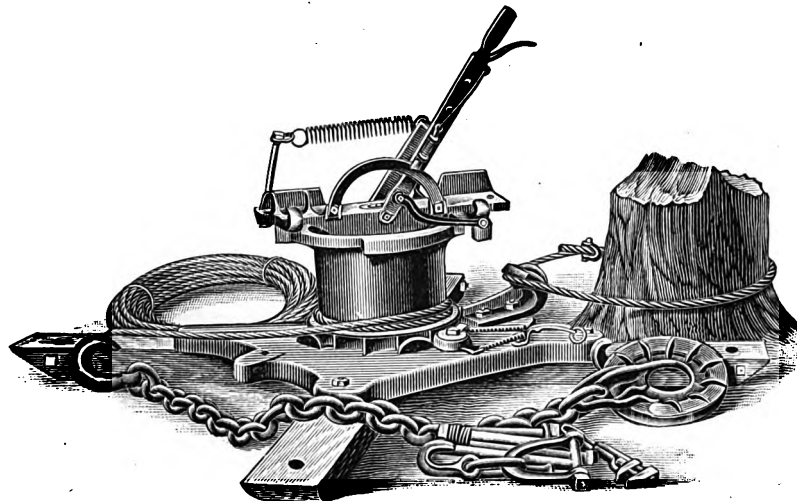


FIG. 5093

These outfits are made to be operated by one or more horses or oxen and can be furnished with either all steel or with gray iron castings. The machines with gray iron castings are the same as the all-steel in design but are cheaper and more subject to breakage. These are combination outfits, that is, they are stump anchored or self-anchoring.

The all-steel machines are made in three sizes. The No. 6 for the ordinary run of work, the No. 7 for moderately heavy work and the No. 8 for extra heavy work and severe service.

The machines with gray iron castings are made in two sizes, the No. 1 for the ordinary run of work and the No. 3 for extra heavy work and severe service.

BAND RESAWS

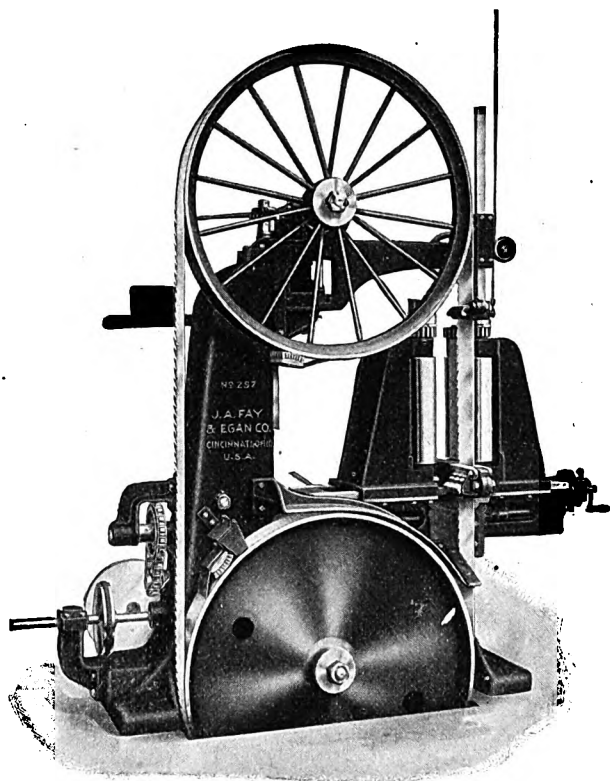


FIG. 3560

HEAVY

Designed for general saw, planing mill and box factory re-sawing. The only band resaw that will straighten a crooked or warped board. Resaws stock up to 24 inches wide. Takes 20 inches between the rolls. Saws to the center of 16 inches, and 28-inch stock can be passed up guide. Wheels are 60 inches diameter, 7 inches face. Carries an 8-inch blade. Upper wheel shaft runs in self-aligning annular ball bearings. Variable speed friction feed works.

This machine can also be furnished with quick-acting lever or saw mill set works.

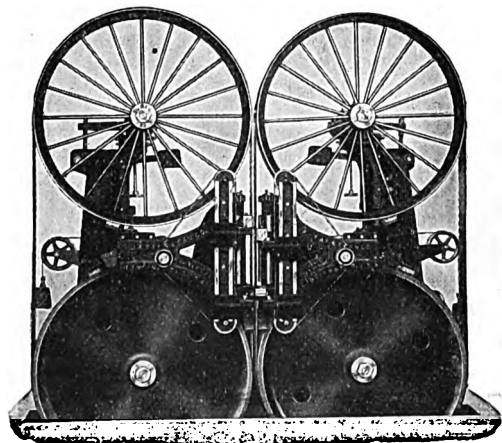


FIG. 3558

LIGHT

Designed for a wide range of general work. Wheels 50 inches diameter, $4\frac{1}{2}$ inches or $5\frac{1}{2}$ inches face. Carries 5 inch blade. Resaws up to 28 inches wide, 20 inches thick, and to center of 16 inches. Upper wheel shaft runs in self-aligning annular ball bearings. Variable speed friction feed works. Feed rolls angle up to 10 degrees.

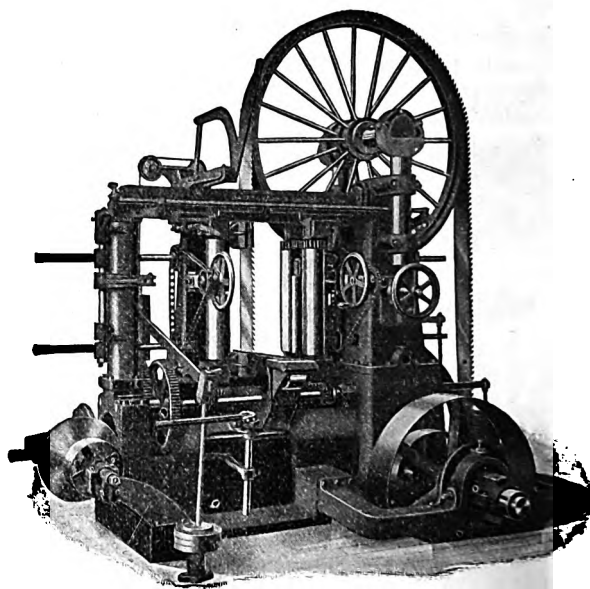


FIG. 3555

TWIN

Designed to meet highest requirements of furniture, box, fruit package and panel makers. This machine for output can not be excelled, and the quality of its work will be found of the highest order.

The machine will resaw timbers up to 24 inches wide and 10 inches thick. It will saw a board into three pieces, $\frac{1}{2}$ -inch thick or three of any other thickness up to 3 inches each. It will saw one piece 3 inches, one 6 inches and one 1 foot; or any combination less than these. By adjusting the movable saw out of the way the machine may be used as a single resaw, sawing up to 3 inches on one side and 6 inches on the other. Wheels are 54 inches diameter, $5\frac{1}{2}$ inches face. Carries 6 inch blades.

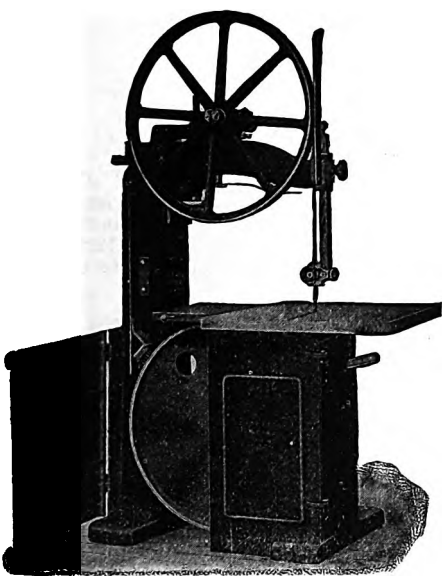


FIG. 3571

BAND SCROLL SAWS

Wheels 36 inches diameter by 2 inches face. Carries blades up to $1\frac{3}{4}$ inches wide; takes 18 inches under guide; table 29 x 33 inches, angles 45 degrees to right, 10 degrees to left; tilting device with quick adjustment and micrometer set provided, extra for pattern work. Lower wheel solid, upper wheel mounted in knife-edge balance with vertical and lateral adjustment and device for canting to track the blade.

Wheels 36 inches diameter, 2 inches face. Carries blades up to $1\frac{3}{4}$ inches wide. Table 33 x 29 inches, angles 45 degrees to right. Takes 15 inches under guide.

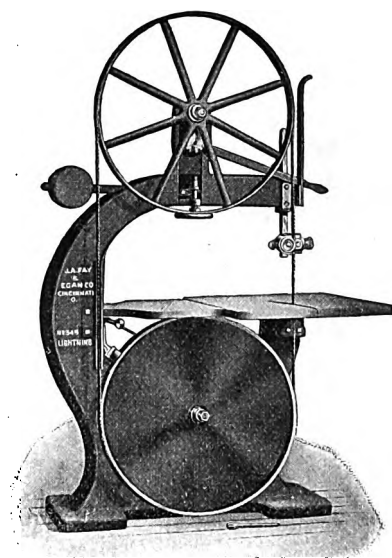


FIG. 3572

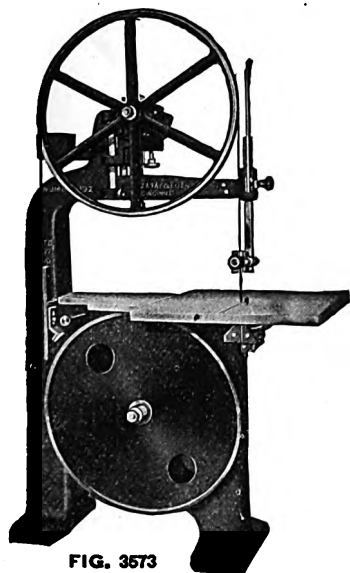


FIG. 3573

Wheels 30 and 33 inches diameter, lower wheel solid square column. Table 24 x 26 inches, angles 45 degrees; carries blades up to $1\frac{1}{2}$ inches wide. Furnished with or without wheel guards as ordered.

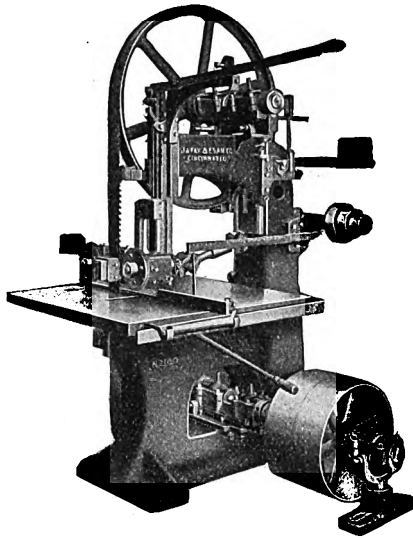


FIG. 3575

BAND RIP AND RESAW

Designed for general ripping and resawing in factories where there is not sufficient work to keep two separate machines going all the time. This is a very economical tool since it does the work of two independent machines, occupying the floor space of but one and costing considerably less than two separate machines.

As a Rip Saw it will handle material up to 24 inches wide, and as a Resaw, it will cut to the center of 8 inches and 18-inch material can be passed under the guide. Feed for ripping, 30 to 140 feet per minute, for resawing 10 to 50 feet per minute.

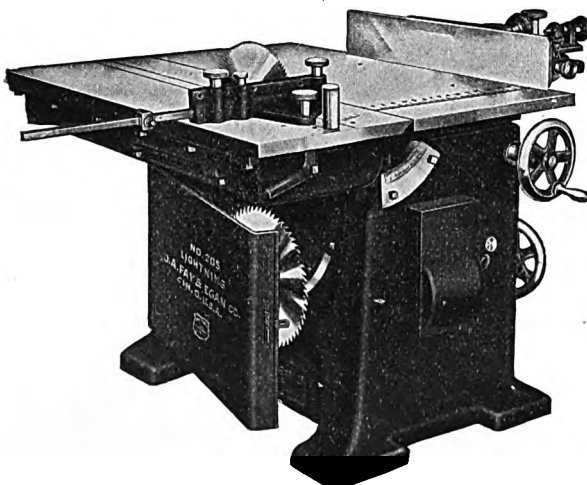


FIG. 3577

BAND RIP SAW

Wheels 42 inches diameter by $3\frac{1}{2}$ -inch face. Carries 4-inch blade; lower wheel solid, upper wheel cast iron spoked type; rips material up to 24 inches wide and 12 inches thick. Regularly furnished with feed speed 30, 60 and 125 feet per minute but can be arranged for 200 feet per minute on special order.

Can also be furnished with chain feed in table.

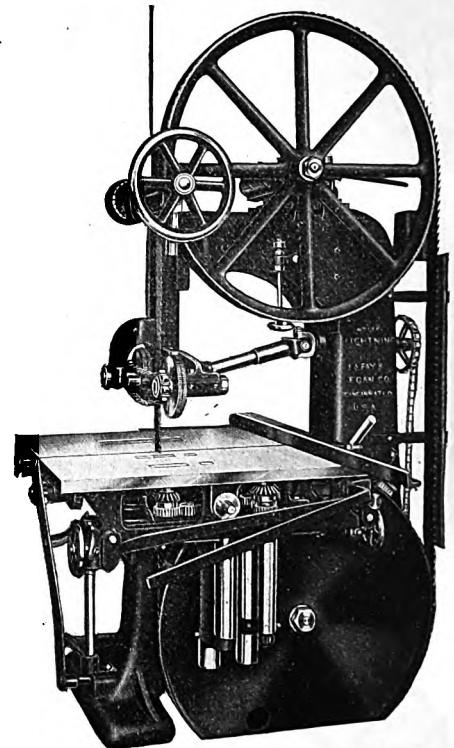


FIG. 3576

UNIVERSAL SAW

Designed for work of extreme accuracy. Saw Blades mounted in a solid plate revolving in wall of the frame insuring absolutely solid bearing and keeps working mechanism free from dust, also makes it easy to change blades.

Automatic Belt Take-up; Traveling Table 44 x 17 inches; Stationary Table 44 x 26 $\frac{1}{2}$ inches with extensions so that material up to 26 inches wide can be ripped. Table angles 45 degrees, travels 35 inches and opens up to permit use of 2-inch dado head. Rip fence has micrometer adjustment; carries two saws up to 16 inches diameter or one saw up to 20 inches diameter.

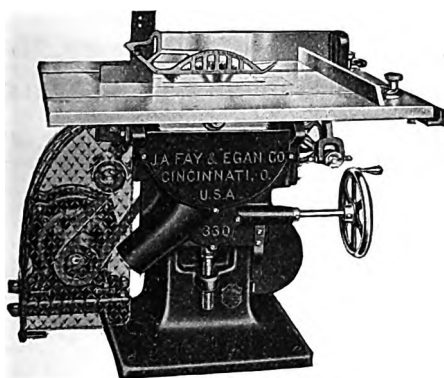


FIG. 3568

STRAIGHT EDGE RIPPING & JOINTING MACHINES

Designed for edging, ripping and jointing lumber. These machines, in one operation, rip to width, make a perfectly straight edge and joint the board so that core stock for veneer tops and panels, kitchen cabinets, tables, caskets, cedar chests, piano cases, furniture and other work of this class can be glued up right from the saw, eliminating the extra handling and glue jointer operation cost and saving from $\frac{1}{8}$ to $\frac{1}{4}$ inch of lumber on every joint. As they have a continuous feed, they require only one-half the space of the ordinary circular edger. Two sizes ripping 18 inches wide and 32 inches wide.

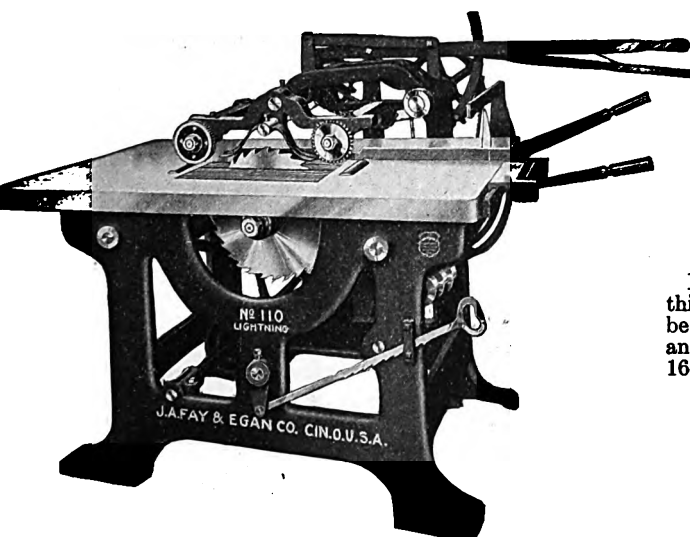


FIG. 3570

VARIETY SAW

Made in two sizes, the larger having table 36x42 inches, the smaller with the table 27x30 inches. Large size made with regular table or with front half of table to travel. All styles can be furnished with boring or Hollow Chisel Mortising and Boring Attachment. Table angles 45 degrees. Sawdust chute and guard underneath table with a 14-inch blade. Will rip stock up to 4 inches thick, $17\frac{1}{2}$ inches to right, 16 inches to left or will cut off up to 1 inch thick and 18 inches wide.

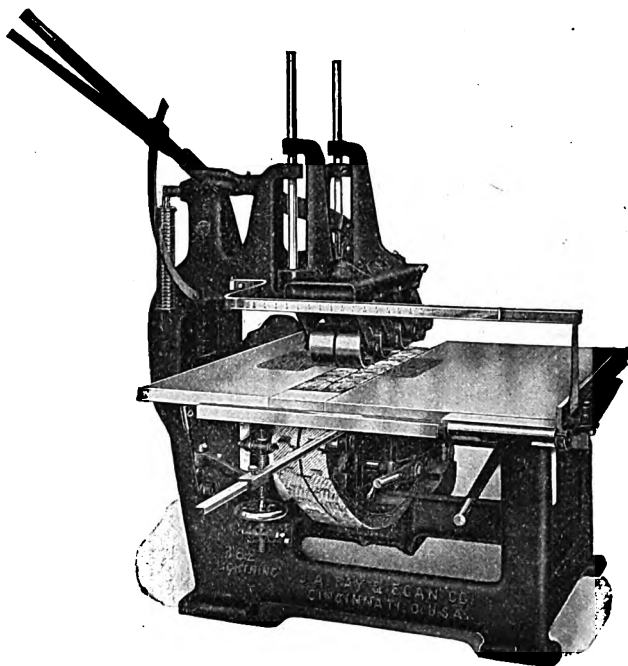


FIG. 3569

SELF FEED RIP SAW

Rips 18 inches between saw and fence and up to $4\frac{1}{2}$ inches thick. Table adjusts $3\frac{1}{2}$ inches vertically by lever. Can also be used as a lath machine. Power driven toothed in-feed disk and fluted out-feed roll, both adjustable. Furnished with one 16-inch saw.

BEACH SAW TABLES

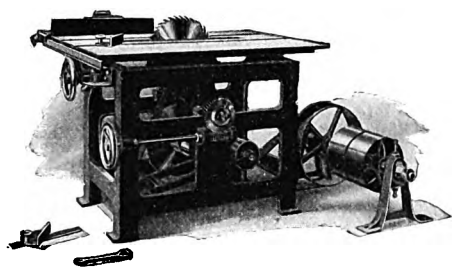


FIG. 3582

DOUBLE ARBOR RIP AND CUT-OFF

Can be furnished with iron or wood frame. Two sizes with tables 34 x 57 inches and 37 x 62 inches. Can be equipped with Boring Attachment. Equipment includes Rip Saw, Cut-Off Saw, Arbor Wrench, Ripping Gauge, Cut-Off and Mitre Gauge and Countershaft.

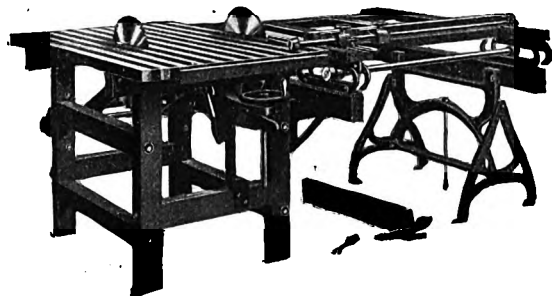


FIG. 3584

COMBINATION RIP AND CUT-OFF WITH EXTENSION

Can be furnished with iron or wood frame. Made in two sizes with tables 34 x 57 inches and 37 x 62 inches. Table has a vertical adjustment of 4 inches at the center. Can be equipped with Boring Attachment. Equipment includes Rip Saw, Cut-Off Saw, Arbor Wrench, Ripping, Cut-Off, Mitre and Stop Gauges.

When ordering machine with Boring Attachment state whether extension is wanted on the right or left hand side of the machine.

DOUBLE ARBOR TILTING TABLE

Heavy one-piece iron frame with iron table 36 x 48 inches. Table may be adjusted to any angle up to 45 degrees. Machine is adapted for both ripping and cross-cutting. Equipment includes Rip Saw, Cut-Off Saw, Ripping Gauge, two Mitre Cut-Off Gauges and Countershaft.

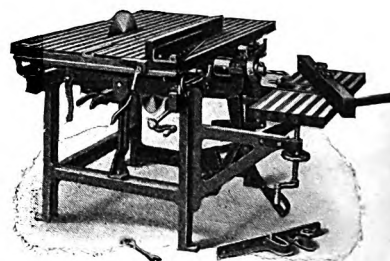


FIG. 3583

COMBINATION RIP AND CARRIAGE CUT-OFF

This machine is not only adapted for ripping and cross-cutting but is the best Dado Machine made by the Beach Company.

The frame is of hard Maple or black Birch. The machine is furnished in two sizes with tables 33 x 54 inches and 35 x 60 inches. Equipment includes Rip Saw, Cut-Off Saw, Arbor Wrench, Ripping Gauge, Cut-Off and Stop Gauge and Countershaft.

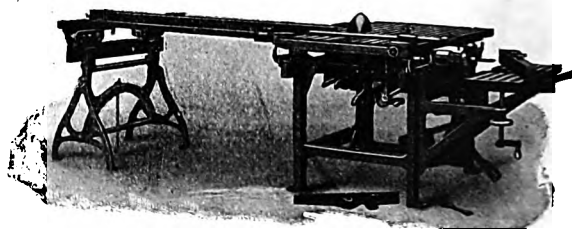


FIG. 3585

BEACH SAW TABLES

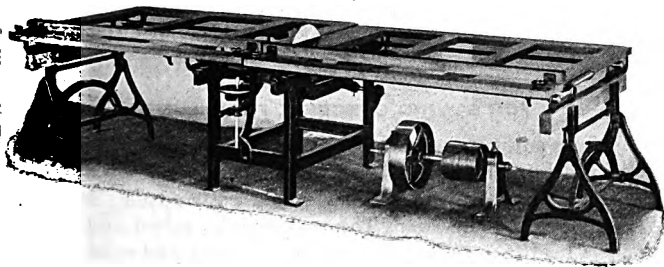


FIG. 3578

CARRIAGE CUT-OFF AND DADO MACHINE

Heavy one-piece iron frame with independent right and left hand tables. Machine can also be furnished with solid table if desired. A removable throat is placed at right of the saw to admit of using Dado Heads. The length of carriage on either side of saw may be varied to meet special requirements. Equipment includes Concave Ground Cut-Off Saw, Arbor Wrench, Cut-Off and Stop Gauges and Countershaft.

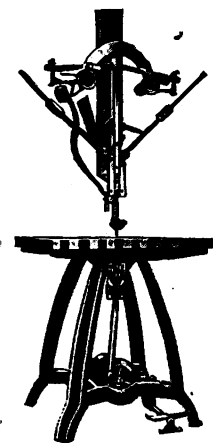


FIG. 3579

SCROLL

These machines are made in four sizes, Nos. 1 and 3 have tilting tables, Nos. 2 and 4 Stationary Tables. All have wooden tables made of narrow strips 38 x 40 inches. Nos. 1 and 2 have cast bases made in one piece, No. 3 has an all-iron frame while the No. 4 is supported on wooden legs.

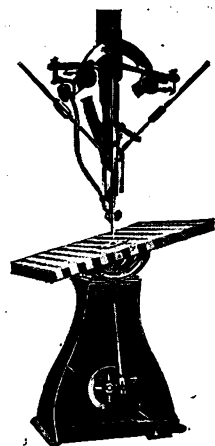
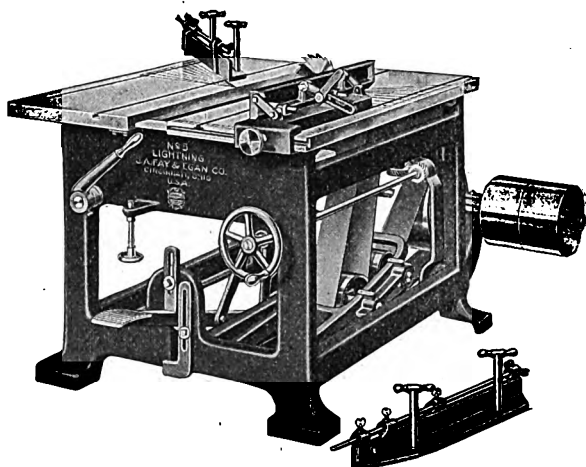


FIG. 3580

COMBINATION SAW AND DADO MACHINE

With a 14-inch Saw, will cut off 17 inches wide, $3\frac{3}{4}$ inches thick or 23 inches wide 1 inch thick and take 14 inches between saw and fence. Table 48 by 36 inches, made in two sections, the left hand section sliding back $6\frac{1}{2}$ inches for gaining head, right hand section hinged for quick access to saw mandrel.

FIG. 3581
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C. H. & E. PORTABLE SAW RIGS

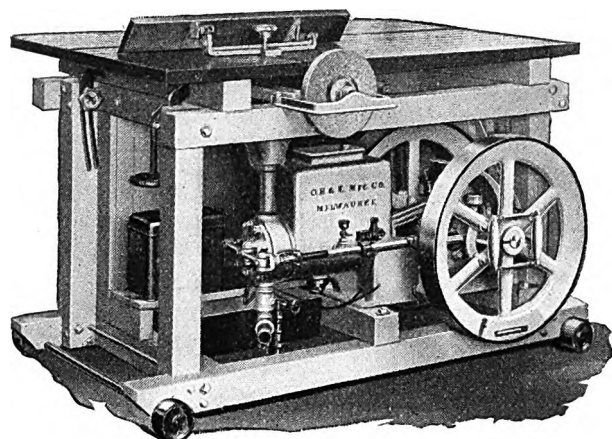


FIG. 3586

NO. 3

FOR VERY LIGHT WORK

A light combination portable woodworker, weighs but 700 pounds complete with all attachments and engine mounted in and directly under the table—can be taken through any standard door, up or down stairs and wheeled to any part of the work. Simple in construction, light in weight, yet strong to withstand the wear and tear of the shop, or the carting from job to job. The table can be raised and lowered and is held in position by a raising screw. The rip and cross-cut guides slide in iron grooves, the rip gauges being adjustable so that lumber can be ripped and planed to a bevel.

Capacity: Will rip one inch lumber, joint four-inch, plow and bore window frames, cut mouldings, do shaping, jig-sawing, rabbetting and sanding.

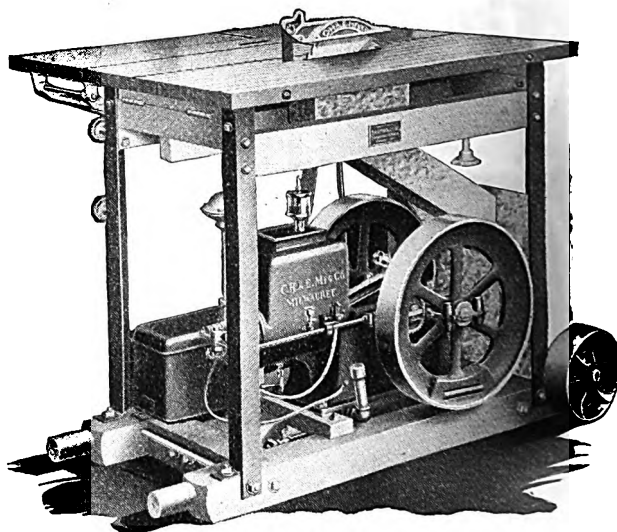


FIG. 3587

NO. 4 ALL IRON

FOR HEAVY CONSTRUCTION WORK

Will rip 4-inch and cross cut 6-inch lumber. The 6 horsepower water hopper cooled gasoline engine and saw table are mounted on 4-inch channel iron skids, reinforced with 4-inch by 4-inch yellow pine. Iron table 42 inches by 68 inches, with screw adjustment for raising and lowering.

Can also be furnished with twin cylinder kerosene engine with ripping capacity of six inches.

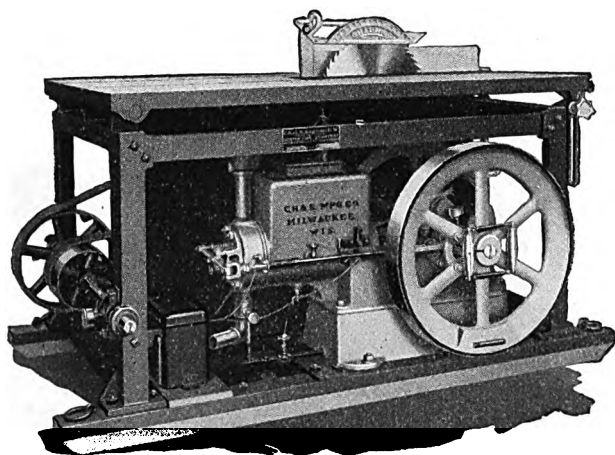


FIG. 3588

C. H. & E. PORTABLE SAW RIGS

NO. 6

A PORTABLE WOODWORKING MILL FOR CONTRACTORS AND LUMBER YARDS

This machine will rip four-inch lumber, joint four inch, and is equipped with mortising attachment to cut up to $\frac{3}{4}$ inch in any length and with boring attachment for holes up to $1\frac{1}{2}$ inch diameter. Can be supplied equipped with a 4 H.P. gasoline engine, 8 H.P. twin cylinder, horizontal kerosene engine or direct or alternating current motor.

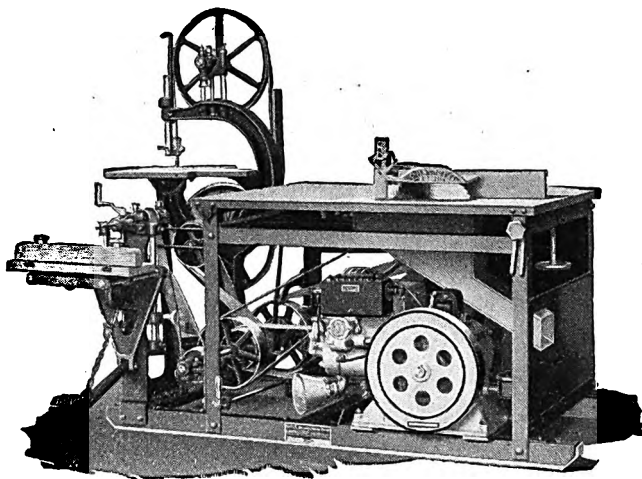


FIG. 3589

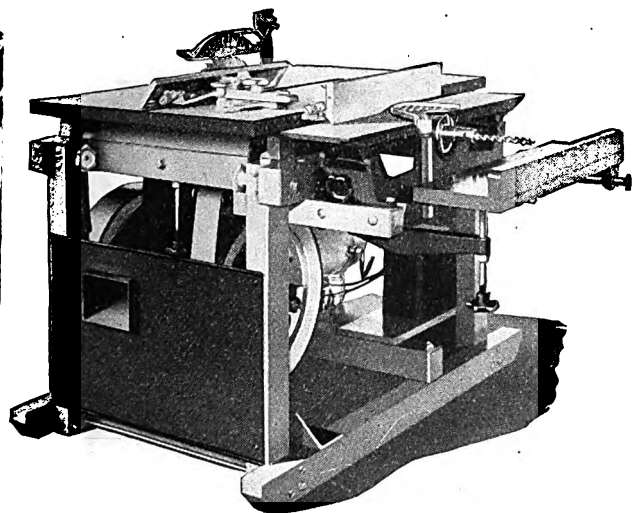


FIG. 3591

NO. 8

A COMBINATION MACHINE FOR LIGHT AND HEAVY WORK

This is a portable, compact and rigid machine; all self-contained and very substantially built. Equipped with 4 H.P. gasoline engine or electric motor. Will rip 3-inch lumber, joint 6 inch, has $6\frac{1}{4}$ -inch wide drum sander and dado head 8-inch diameter, cutting $1\frac{1}{2}$ inches deep. This machine will do all the ripping, cross-cutting, boring, jointing, dadoing and sanding; in fact, all of the mill work in the ordinary shop.

NO. 10

FOR FAST RIPPING AND CROSS CUTTING

This machine has been designed to meet the demand for a powerful rip and cross-cut outfit. Is equipped with an 8 H.P. two-cylinder kerosene engine. Will rip 6-inch lumber and cross cut lumber up to 6 by 8 inches. Can also be supplied with direct or alternating motor.

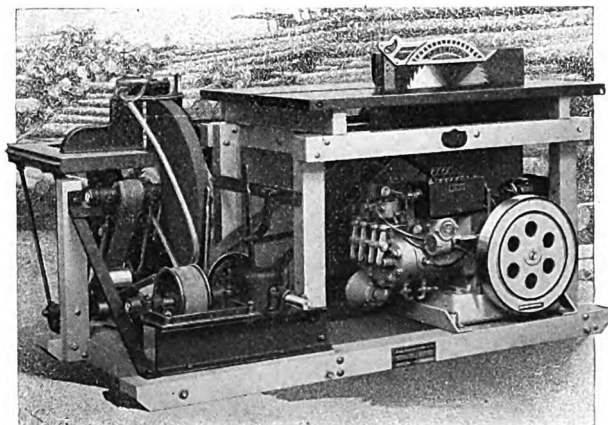


FIG. 5094

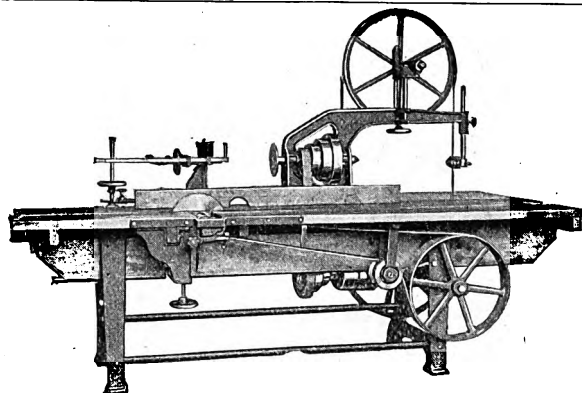


FIG. 5095

CRAIN COMBINATION WOODWORKER

TWELVE MACHINES IN ONE

This machine embodies a rip and cut-off saw, a band saw, a planer jointer, shaper or edge moulder, a lathe, a borer, a tenoner and a drill; its design is such that almost any desired woodworking operation can be performed on it without extra attachment excepting, of course, changing tools. Three men can work at it at one time without interfering with each other.

GANG CLEAT SAW

Boards up to 2 inches thick, of any width and either long or short, can be ripped on this saw.

This machine is strongly recommended for use in all box factories; because it is adapted for a variety of different purposes, the principal ones being the sawing of cleats and as a self-feed rip saw. Standard size cleats and widths for small boxes can be cut out of scraps.

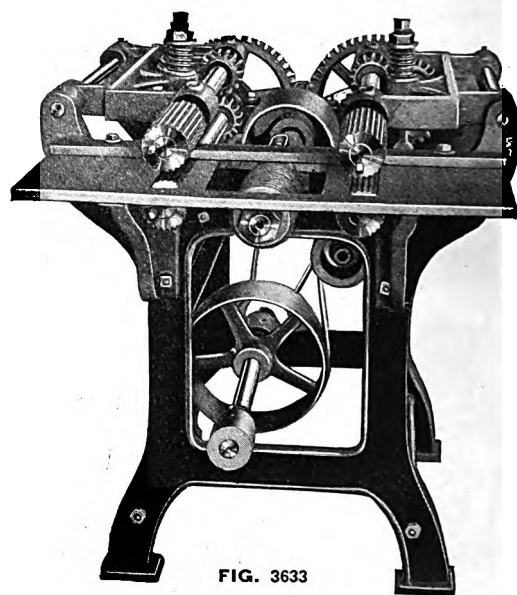


FIG. 3633

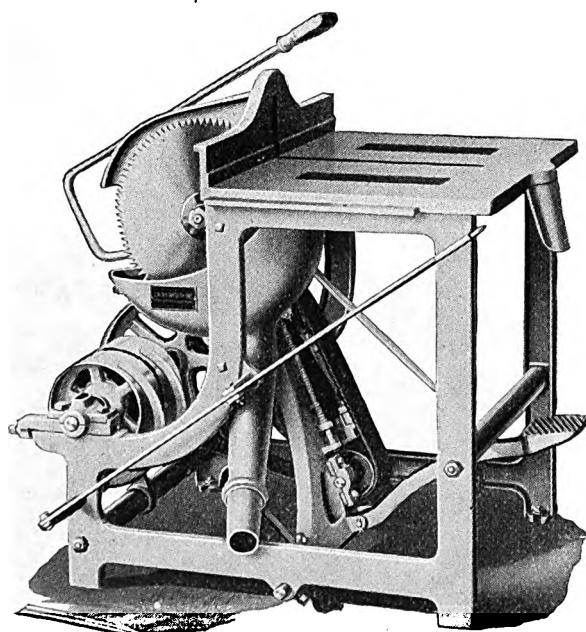


FIG. 3590

THE C. H. & E. NO. 5 RAPID CUT-OFF SAW

This machine has a movable cross-cutting saw. The saw is 16 inches in diameter and will cut the following size stock: 18 x 1, 16 x 1½, 14 x 2, 12 x 3 inches, and 4-inch thick up to 10 inches in width. Saw can be fed into work either by hand or foot. Regularly equipped with 3 H.P. kerosene engine, but can be supplied with 5 H.P. engine or with direct or alternating current motor.

SWING CUT-OFF SAWS

NOS. 0, 1, AND 3

Cast-iron, double arm frames swinging on sleeve bearings which are not affected by wear of countershaft. Lower bearings adjustable and removable. Expansion mandrel.

Nos. 0 and 1 will cut off 7 inches square or 22 inches wide by 1 inch thick, with a 24-inch saw. No. 2 with a 36-inch saw, will cut off 10 inches square or 26 inches wide by 1 inch thick. No. 3 will cut off 15 inches square or 26 inches wide by 1 inch thick with a 48-inch saw.

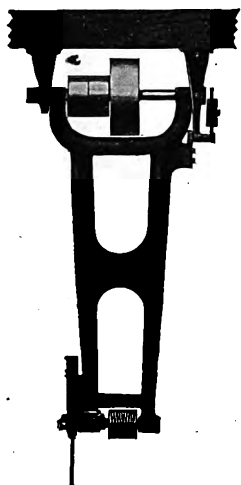
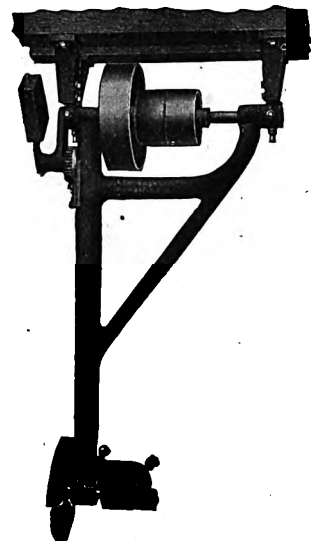


FIG. 3563
NOS. 0, 1, 2 AND 3

NO. 53

Single cast-iron arm made for ceiling or wall support. Frames swing on sleeves and are not affected by countershaft wear. Expansion mandrel, adjustable and removable bearings, automatic counterweight with regular 16-inch saw, will cut-off regular 4 inches square or 20 x 1 inch. 24-inch saw maximum will cut off 6 inches square or 24 x 1 inch.



NO. 53—FIG. 3564

IMPROVED NO. 1

Furnished in regular belt drive or for direct motor drive.

The frame, with the exception of the lower part which carries the arbor, is cast in one piece and cored hollow, thus giving a maximum strength with a maximum weight. The frame hangs on hangers instead of on the countershaft, doing away with imperfect alignment caused by wear and insuring utmost rigidity.

Will accommodate a saw up to 24 inches.

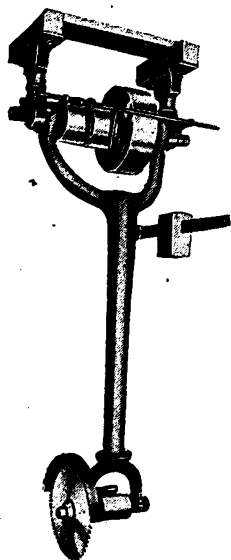


FIG. 3565

SWING SAW IRONS

We can furnish the iron-work separately as shown in Fig. 3566 to those desiring to make up swing saws to meet certain conditions. Suitable for carrying saws 24 inches diameter to 44 inches diameter. Mandrels and swing boxes made to swing either from above or below. Several sizes of mandrels for wood frame machines, with separate boxes, also made, instead of connected frame as shown in cut.

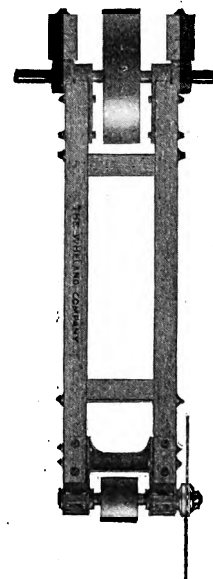


FIG. 3566

HIGH SPEED FLOOR TYPE

This machine contains practically an automatic movement and is fitted up for stationary work as well as portable, motor or belt drive. The cut shows the No. 2 High Speed Patented Floor Swing Cut-Off Saw direct connected to 3 Horsepower Motor by means of a flexible coupling. Can also be obtained with tight and loose pulleys.

Will cut off material 1 inch thick up to 20 inches wide, or 2 inches thick by 18 inches wide; or 3 inches thick by 15 inches wide; or 3½ inches thick by 12 inches wide, with a 14-inch saw. Saws up to 18 inches may be used.

In writing for prices on motors or motor driven machines it is necessary to give the following information before a price can be quoted: What is the voltage required? Is the current direct or alternating? If alternating, is it singlephase or polyphase? Also what is the frequency or cycle?

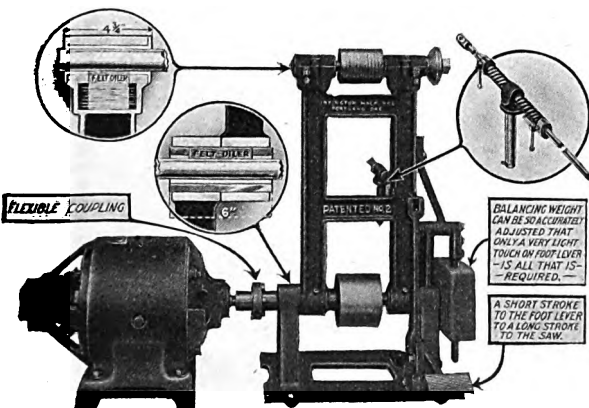


FIG. 3567

HAND OR BUZZ PLANERS AND JOINTERS

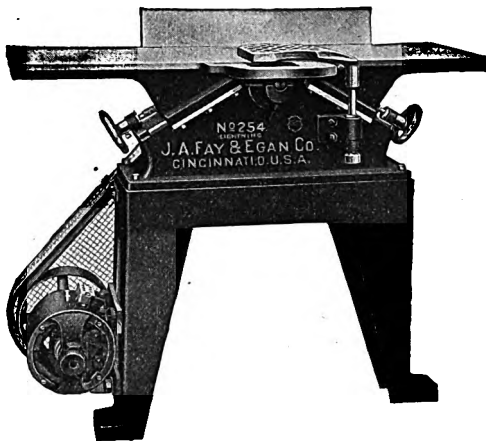


FIG. 3597

Two sizes: 6½ and 8 inches.
Furnished with or without iron pedestal.
Can be furnished for either belt or motor drive. For 4-inch and 6-inch jointers see page 540.

Made in five widths: 8, 12, 16, 20 and 24-inch:
Can be furnished for either belt or motor drive.
Motor driven machines are furnished with high speed motor connected to cylinder shaft by flexible coupling.



FIG. 3595

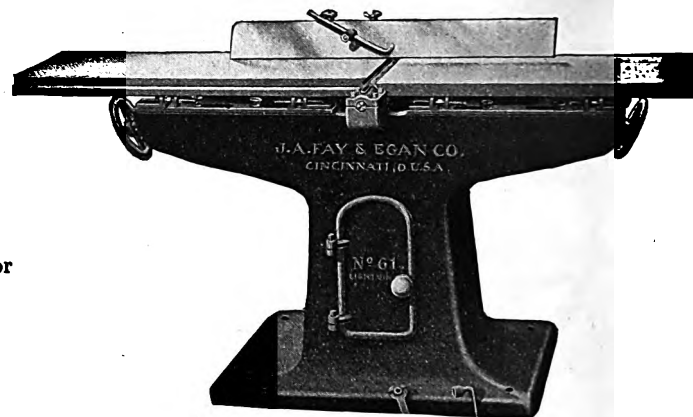


FIG. 3596

Made in five widths: 12, 16, 20, 24 and 30-inch.
Tables adjust on long continuous ways—cylinder bearings adjustable—draughting attachment. Can be furnished for either belt or motor drive.

SINGLE AND DOUBLE PLANERS WITH TRAVELING BED

Made single in three sizes: 24, 27 and 30-inch and double in two sizes: 24 and 30-inch. These sizes represent the widths the machines will surface and they will work from the finished material to 12 inches thick. They are all equipped with sectional rolls, power raising and lowering attachment for bed.

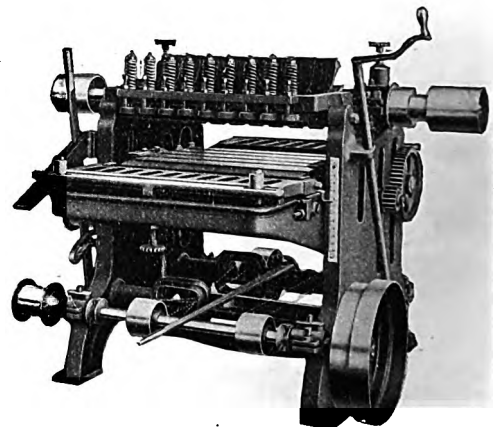


FIG. 3600

SINGLE CYLINDER SURFACERS OR PONY PLANERS

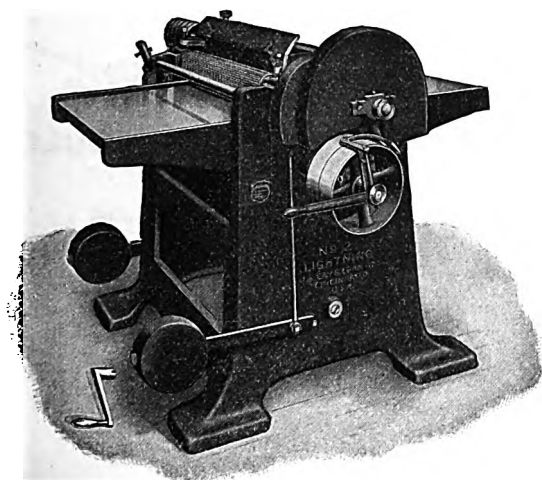


FIG. 3598

Made in three widths: 16, 20 and 24-inch to work up to 6 inches thick.

Designed for general light work in jobbing shops, furniture, sash and door and box-making establishments. Can be furnished for either belt or motor drive.

Works Stock 24-inch wide by 8-inch thick.

Cylinder double belted. Spring pressure, works stock as short as 6 inches. In-feed roll made sectional when so ordered.

Designed to do a superior quality of surfacing in both hard and soft wood, in chair, furniture, wagon, jobbing shops and agricultural works, and as a special cigar box factory surfer.

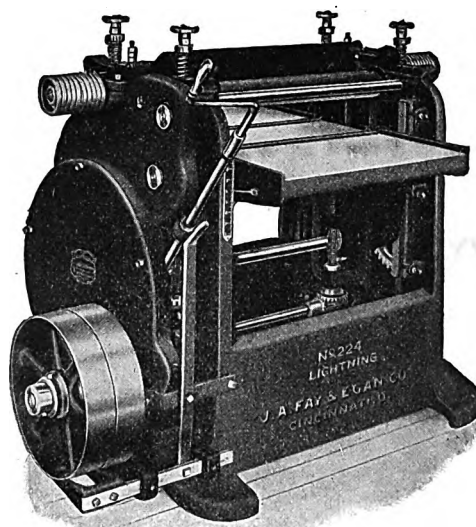


FIG. 3599

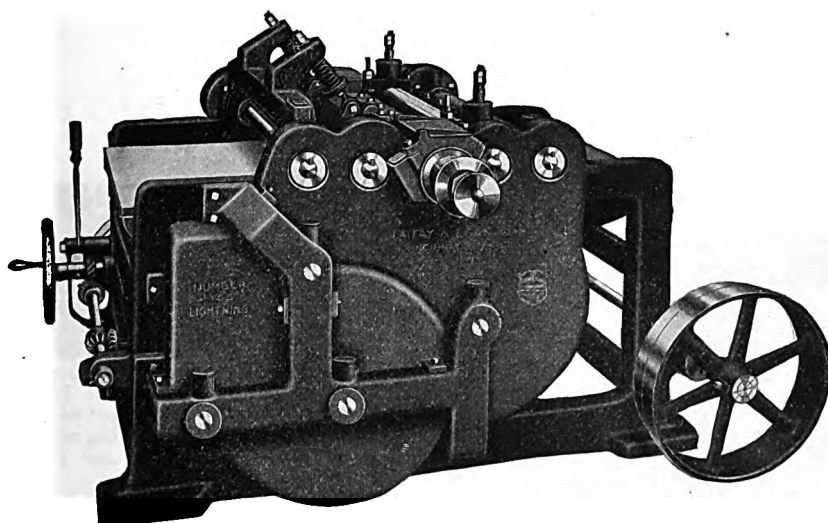


FIG. 3601

CABINET SMOOTHING PLANER

Works Stock 24, 27, 30, 36 and 42 inches wide by 7 inches thick. Bed raises and lowers on continuous inclines. Feed rolls 5 inches diameter powerfully driven. Spring pressure to feed rolls. In-feed roll made sectional when ordered.

Designed for use in furniture, piano and cabinet factories, or wherever a fine, smooth surface is required.

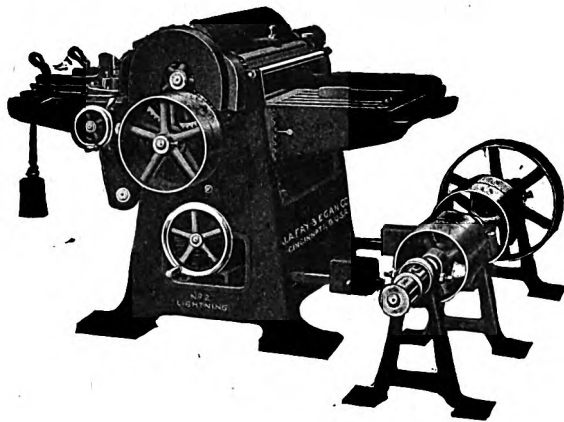


FIG. 3602

PLANER MATCHER AND MOULDER

A medium priced machine for general work. Planes 24 inches wide, 6 inches thick, matches 12 inches wide and molds $\frac{1}{2}$ inch deep. All gears cut from the solid and enclosed.

HEAVY FOUR-SIDE MOULDER

Two sizes: to work up to 12 and 14 inches wide.

Designed for extra heavy molding. A special inside, outside high duty machine that will give highly efficient results on the heaviest work.

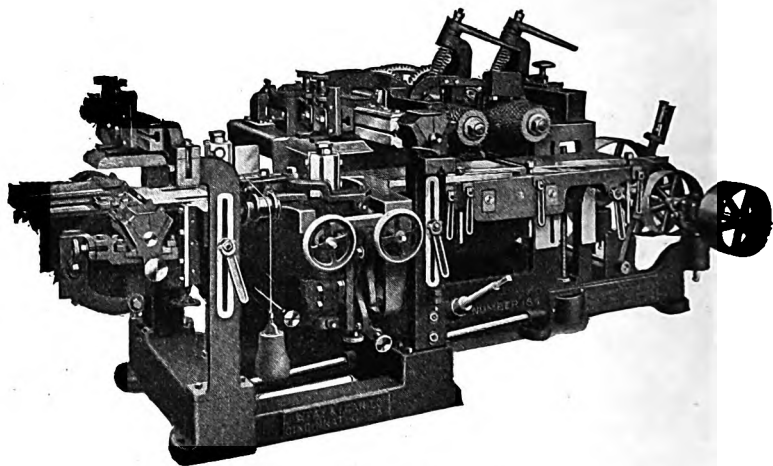


FIG. 3603

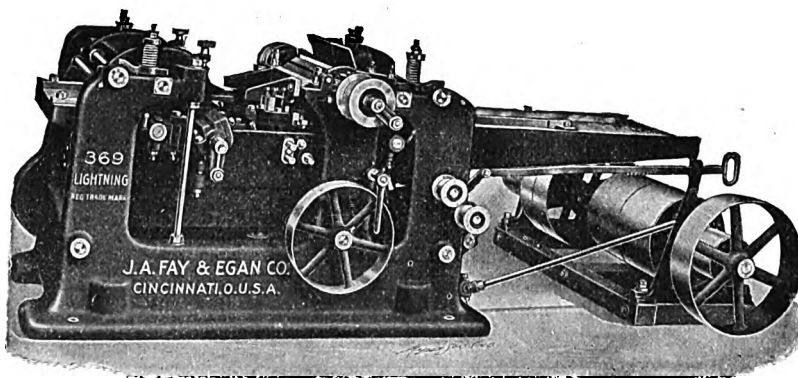


FIG. 3604

PLANER & MATCHER

Designed for general all purpose mill and factory work. Equally efficient as a single or double surfacer, matcher, floorer or moulder. Especially adapted for portable mills, mills which change location frequently, or for foreign shipment, as the infeed table can be detached, making transportation very easy. Planes two sides up to 24" wide and 8" thick. Matcher up to 15" wide. Pressure bars adjust to permit use of overswinging cutters for making moulding patterns up to $1\frac{1}{2}$ " deep on upper and 1" deep on lower cylinder.

FAST FEED PLANER AND MATCHER

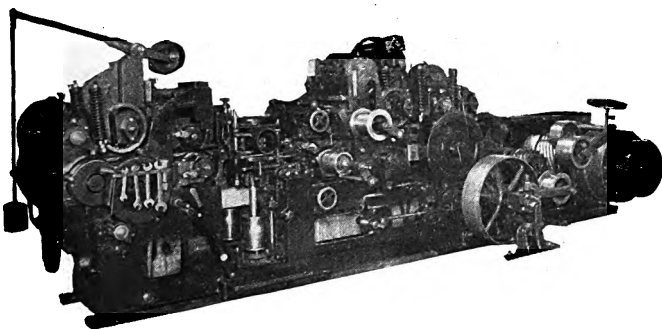


FIG. 5096

This cut shows the operator's side equipped with heavy double built-in profile. Feedworks consist of six 12-inch rolls driven by cut gears running in grease in dust-proof covers. Top infeeding rolls are controlled by a hand wheel at the operator's position. Top out feeding roll is controlled by foot lever at operator's position. The chip breaker for the top cylinder is sectional with removable steel lips. Each section is 5 inches wide. Regularly furnished with four rates of feed such as 200, 250, 300 and 350 feet.

Made in sizes 6x9 inches, 6x15 inches, 6x20 inches and 6x30 inches.

FAST FEED FOUR SIDE QUICK CHANGE TIMBER SIZER

This machine is not only capable of running timbers up to full size but it is capable of running 2x4's, 2x6's, 2x8's, 2x10's, etc., S1, S1E or S4S at feeds ranging up to 275 feet per minute. The side head spindles are equipped with removable top bearings so that the side heads may be replaced with heads for ship-lap, 1-inch flooring or car decking heads, etc. All such stock may be run at rapid feeds ranging up to 200 and 250 feet per minute.

Regularly equipped with either four or six-knife round cylinders and one pair of 16-inch square removable side heads which are fitted to tapered self-centering spindles.

Made in sizes 16x20 inches, 20x20 inches, 16x30 inches, 20x30 inches and 24x30 inches.

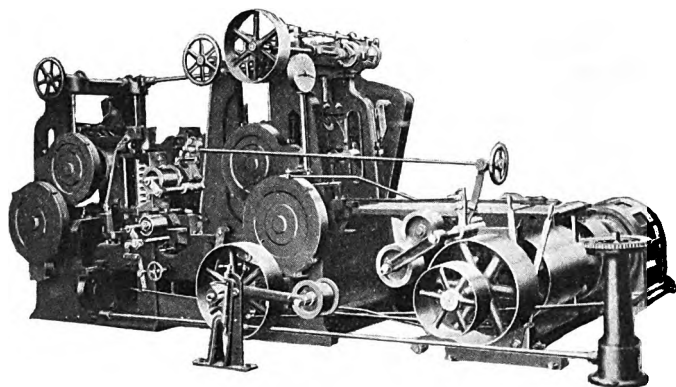


FIG. 5098

FAST FEED PLANER, MATCHER AND SIZER

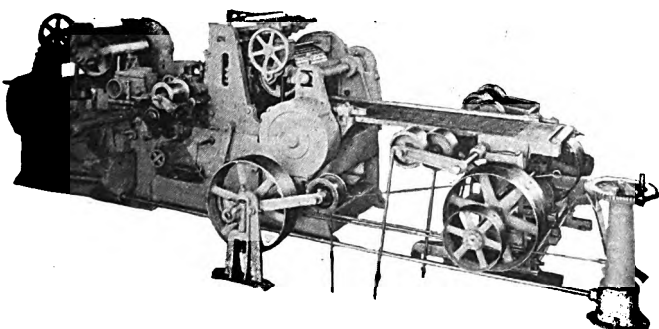


FIG. 5097

This is a heavy compact machine equipped with the most simple and effective feedworks. Frame is extra heavy and is of modern design. The only modern Fast Feed Planer and Matcher on the market today that opens 8 inches. This feature makes this machine very popular with the smaller mills because of the fact that it will surface stock up to 8 inches in thickness, four sides and it is also suitable for running flooring, shiplap, dimension, shop, box lumber, etc. Feed ranges from 300 feet down, varying with the class of work and the number of knives in cylinders and side heads.

Regularly furnished with six-knife round cylinders fitted with thin high-speed steel knives. Jointing attachments.

Made in the following sizes: 8x15 inches, 8x20 inches and 8x30 inches.

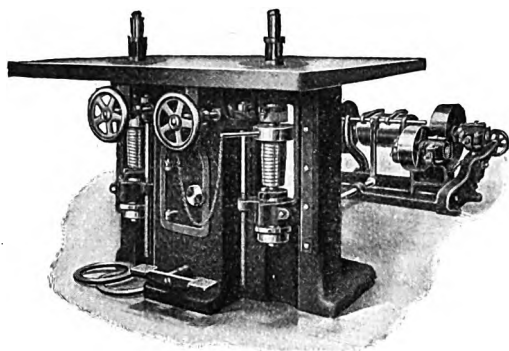


FIG. 3607

HIGH SPEED DOUBLE SPINDLE SHAPER

Table 42 x 54 inches. Made in large size with table 48 x 62½ inches; with or without top spindle bearings.

Designed for the heaviest kind of work such as is found in carshops, agricultural implement factories, vehicle and automobile factories.

SASH AND DOOR STICKER

For sticking sash stiles and plowing and boring for the sash cord, etc. Top rolls raise to stop feed. Works three sides 4 inches wide; also made to work two sides, with top and side head only, or with top and bottom heads only, or to work one side with top head only.

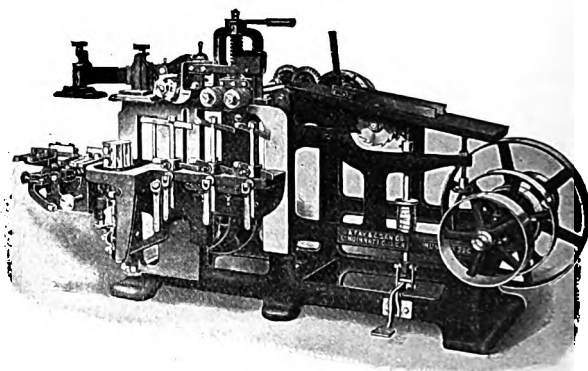


FIG. 3606

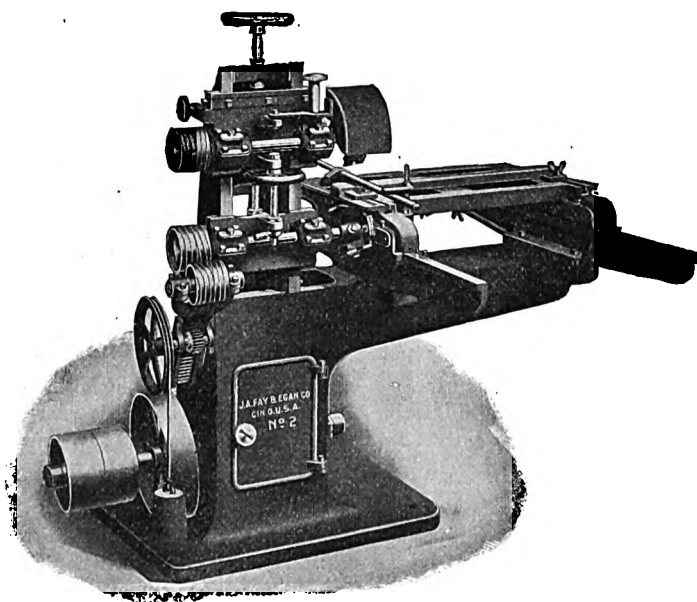


FIG. 3608

SINGLE END TENONER

Will tenon and cut off up to 20 inches wide.

Will tenon 3¼ inches long in one cut, 6½ inches in two cuts; made single head or double head with single or double copes and with or without cut-off attachment.

Carriage mounted on barn-door type rollers; moves very lightly and is fitted with stops for regulating the cut.

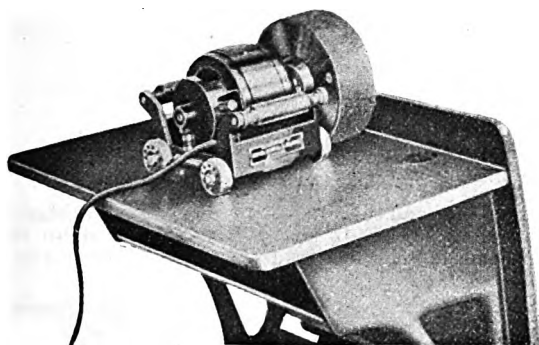


FIG. 5099

ELECTRIC WOOD SURFACING MACHINE

This is a small, compact motor-driven machine for use on any wood surfaces requiring an improved finish. Whether as a refinisher, to get away from the tedious and uncertain process required in using liquid varnish removers, etc., on desks, counters, tables or to dress new work—show windows, sills, etc., this machine will give rapid and satisfactory results.

ELECTRIC FLOOR SURFACING MACHINE

This machine will surface perfectly all wood floors—hard or soft, new or old, rough floors or the finest parquetry—as well as rubber, cork, fibre, linoleum, etc.

Furnished in four sizes with surfacing roll 9 inches, 12 inches, 15 inches and 18 inches long by 8 inches in diameter. Furnished for either direct or alternating current.

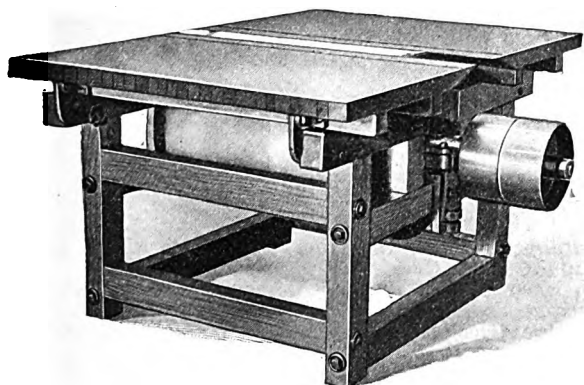


FIG. 3610

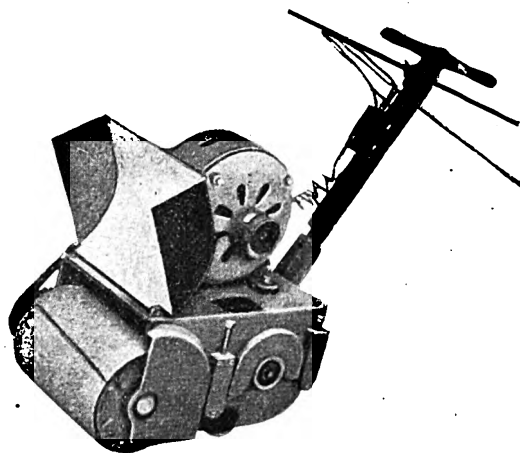


FIG. 5100

BEACH WOOD FRAME DRUM SANDER

The tables are made of thoroughly seasoned and kiln-dried Maple and are securely cleated to prevent warping. Each table is adjustable, either to or from the drum, or can be turned back entirely exposing the drum. The Frame is made of Hard Maple. The Sand Drum is 20 x 24 inches, of iron with wood lagging, turned perfectly true and balanced. It is covered with brussels carpet to produce a yielding surface to the sandpaper.

BEACH COMBINATION DISC AND DRUM SANDER

Same construction as Drum Sander shown above.

The Sand Drum is 20 x 24 inches, covered with brussels carpet to produce a yielding surface to the sandpaper. Disc is 28 inches diameter.

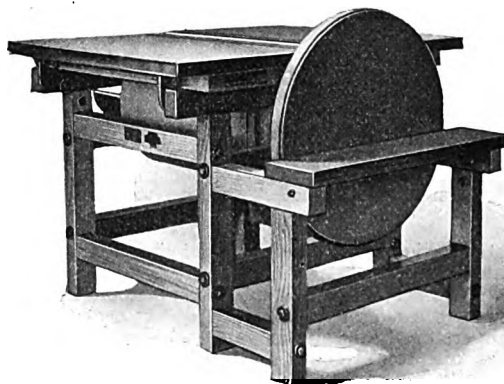


FIG. 3611

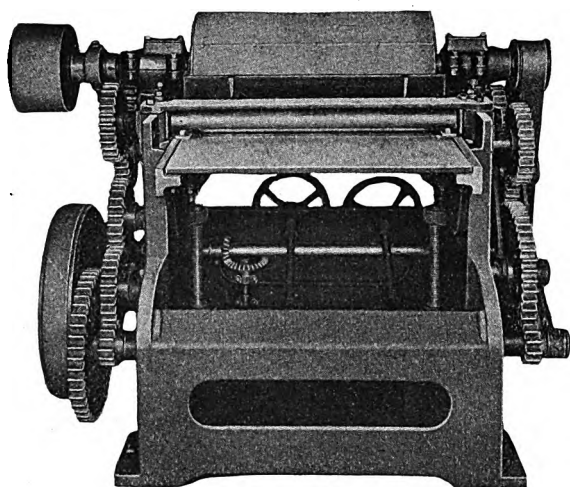


FIG. 5101

ONE-DRUM SANDER

This machine will sand stock 5 inches thick, and is furnished in the following widths: 24, 30, 36, 42 and 48 inches. The drum on this machine is independent, and can be adjusted to any cut desired by moving the hand wheel.

TWO-DRUM SANDER

This machine allows the feeding of stock varying in thickness to $\frac{3}{16}$ inch without the least adjustment or injury to drums or paper. Furnished in the following widths: 24, 30, 38, 42 and 48 inches, and is suitable for sanding and smoothing all plain surfaces or hard and soft woods.

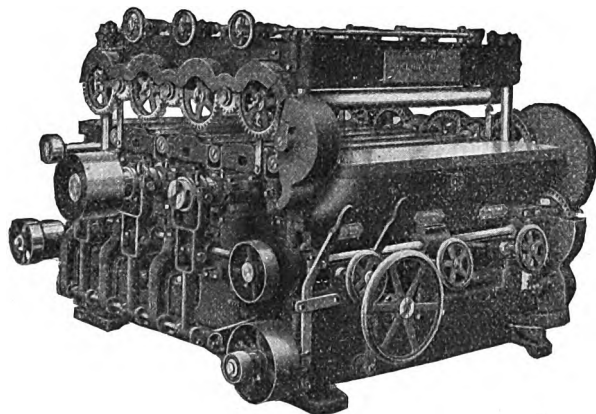


FIG. 3613

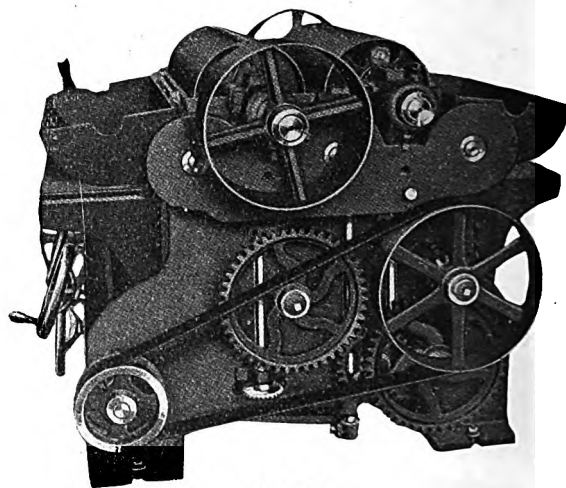


FIG. 5102

THREE-DRUM SANDER

Furnished in nine sizes: from 30 to 80-inch widths, taking stock up to 8 inches thick.

Designed to meet the highest requirements in furniture, piano fixture, door factories or any other woodworking establishments where perfectly smooth surfaces are wanted for varnishing.

FLEXIBLE HOLLOW ARM SANDER

The 6 ft. swing of the flexible arms gives a working range over flat surfaces of all kinds in the manufacture of sash, doors, blinds, cabinet work, desks, coffins, stairs, etc. Can be quickly changed from a sander to a borer or router; pressure on discs at will of operator. Sand dust is removed through hollow arms not through operator's mouth and nose.

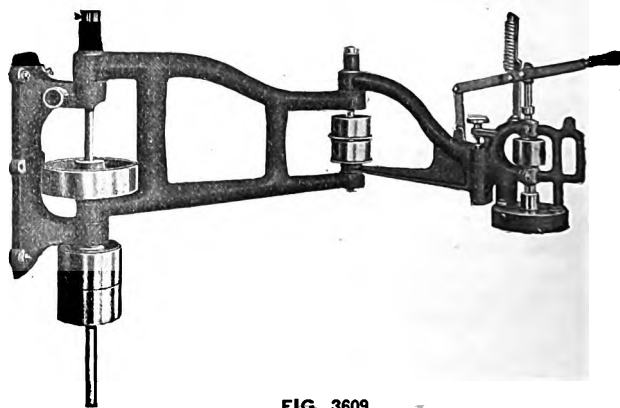


FIG. 3609

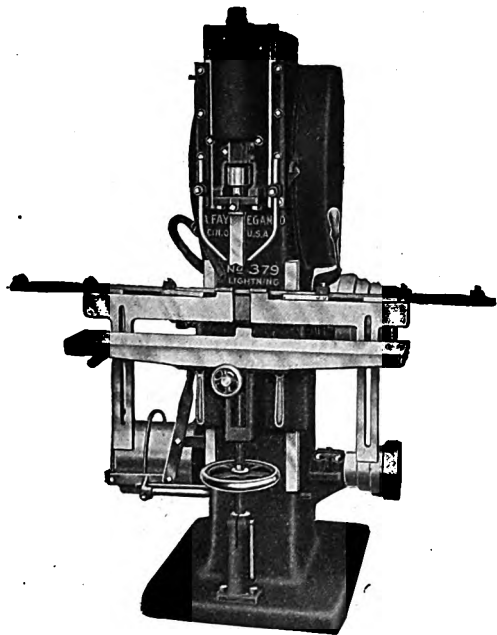
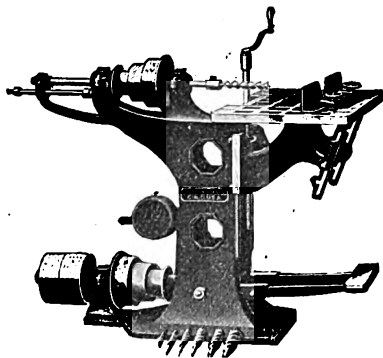


FIG. 3619

POST BORERS

No. 1 has 9-inch stroke, bores $1\frac{1}{2}$ inches diameter.
 No. 2 has 12-inch stroke, bores 2 inches diameter.
 No. 4 has 16-inch stroke, bores 2 inches diameter.
 Nos. 1 and 4 have adjustable table brackets. Spindle on
 No. 1 Stationary; on No. 2 Radial has transverse and angular
 adjustment and on No. 4 transverse adjustment only.

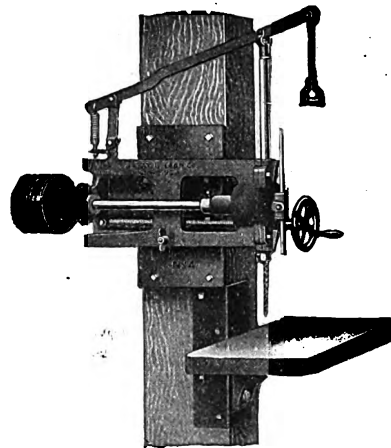
FIG. 3615
HORIZONTAL BORER

VERTICAL AND UNIVERSAL BORERS

No. 1 has single vertical spindle, capacity 2 inches, and is
 furnished with one or two speeds.
 No. 190 has both vertical and horizontal spindle, capacity
 2 inches, and Universal table 10 x 30 inches.

VERTICAL HOLLOW CHISEL MORTISER

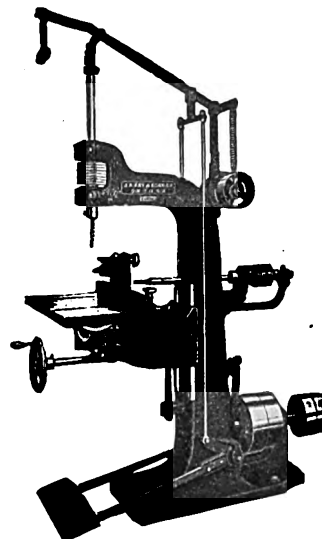
Regularly made with handle conveniently located for stop-
 ping and starting stroke; can be furnished with foot control.
 Will mortise to a depth of 5 inches or through 10 inches
 by reversing and up to $1\frac{1}{2}$ inches square, any larger or irregularly
 shaped mortise is easily made by overlapping cuts. Takes stock
 15 inches under the chisel and 4 inches from center of chisel
 to fence.

FIG. 3614
POST BORER

HORIZONTAL BORERS

Nos. 2 and 3 iron frame, Hardwood table No. 341 Universal
 all iron. No. 2 double spindle bores up to $\frac{3}{4}$ -inch diameter from
 1 inch to 6 inches apart, from horizontal to vertical. No. 3
 double spindle bores up to $\frac{3}{4}$ -inch diameter from 1 inch to 10
 inches or 16 inch from horizontal to vertical.

No. 341 Universal 9-inch stroke. Bores up to 2 inch diame-
 ter, table moved by treadle and angles 30 degrees either way.

FIG. 3616
VERTICAL AND UNIVERSAL BORER

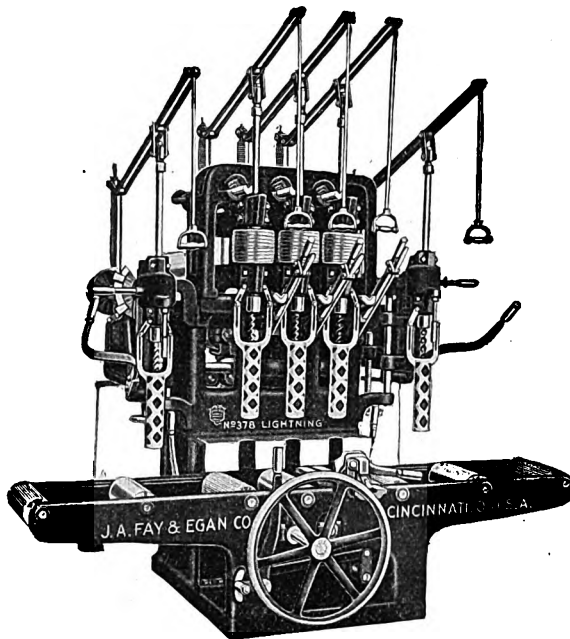


FIG. 3617

HEAVY MULTIPLE BORER

Designed for heavy work in car, bridge and shipyard construction. Made regularly as a three spindle machine, but can be furnished with one or two auxiliary spindles, arranged for either straight or angle boring. Can be used in connection with No. 350 Mortiser and No. 331 Gainer as a combination machine. Entirely self-contained and arranged for individual motor drive.

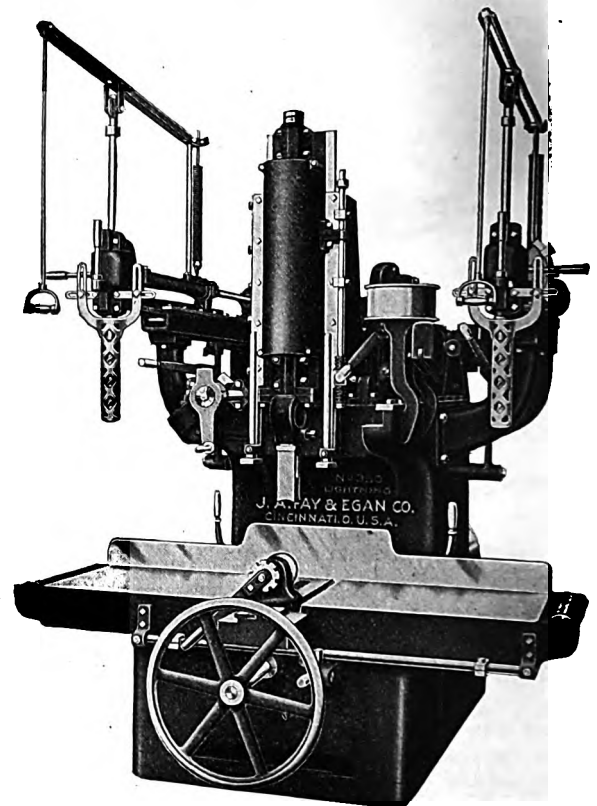
Will take timbers 15 x 15 inches; center to center of spindle 9 inches; stroke of spindles 16 inches; largest diameter will bore 3 inches; transverse travel of spindles 15 inches.

AUTOMATIC VERTICAL HOLLOW CHISEL MORTISER

Designed for heavy mortising and made with plain or traveling table and with or without boring attachments, either straight or angle type.

Traveling table machine is a complete unit or may be used in connection with Gainer or Borer or both, making a great time and labor saving combination car shop unit; entirely self-contained and can be belted from any direction or direct connected to motor.

Will work timbers up to 18 x 18 inches and mortise from $\frac{1}{2}$ inch to 3 inches square and up to 6 or 8 inches deep with 8-inch chisels; or by reversing through 12 or 16-inch timbers. Larger and irregular shape mortises can be made by overlapping cuts.



TURNING AND PATTERNMAKERS' LATHES

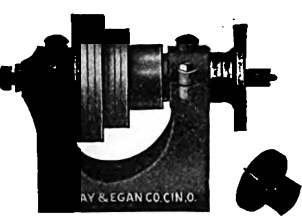


FIG. 3620

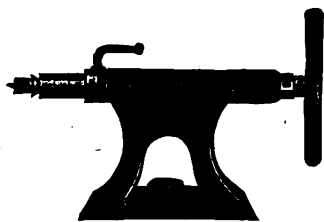


FIG. 3621

Swing 20, 24 and 30 inches over the bed and 15 $\frac{3}{4}$, 19 $\frac{3}{4}$ and 25 $\frac{3}{4}$ inches over the carriage. Headstock swivels five degrees either way.

Tailstock can be set out of line 1 $\frac{1}{2}$ inches.
Hand or Power Feed Carriage with instant reverse.
Countershaft fitted with two pair of tight and loose pulleys, giving eight speeds to the head spindle.

Furnished as Lathe Sets only or with Iron Beds with or without movable carriage with plain rest, compound swivel rest, taper attachment, etc. Sets made single or double and furnished 12, 14, 16, 18, 20, 24 and 30-inch swing.

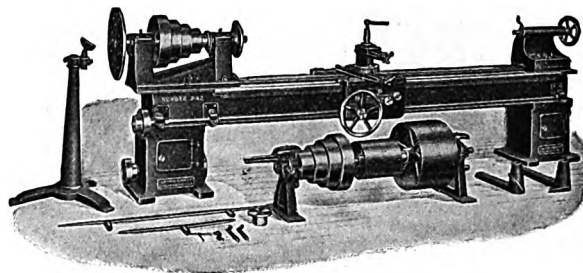


FIG. 3623

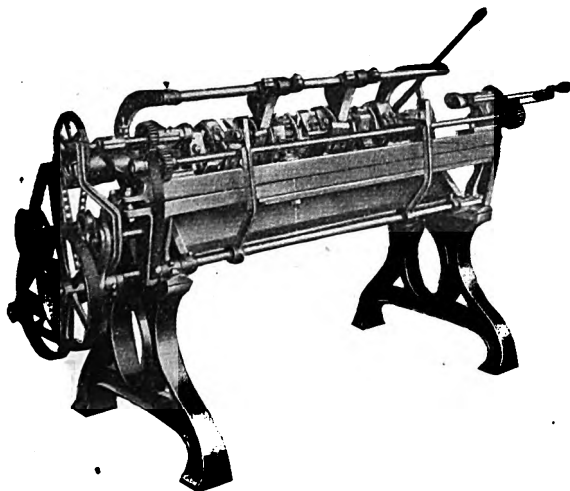


FIG. 5103

AUTOMATIC SHAPING

This machine will handle practically anything in the way of plain or fancy turnings, producing either round, square, octagonal, hexagonal, oval or any polygonal shape. Among the more common uses might be mentioned the turning out of table legs and pedestals, piano pillars, piano stool legs, standards and posts for bureaus, chiffoniers, table and toilet stands, bed posts and reaches, chair legs, couch legs, casket corners, coffin handles, ten pins, Indian clubs, dumb bells, neck yokes, ball bats, lawnmower rollers and handles; in fact, most any style or shape of turning of a size coming within its range.

This machine is made in three sizes: Centers swing over carriage table 18 inches, maximum length of cut in one operation 32, 42 and 48 inches.

COLUMN FACE LATHE

Designed for turning large diameters. Made in three sizes, 25 and 12 foot swing. Last two furnished with iron bed, movable carriage and tool post.

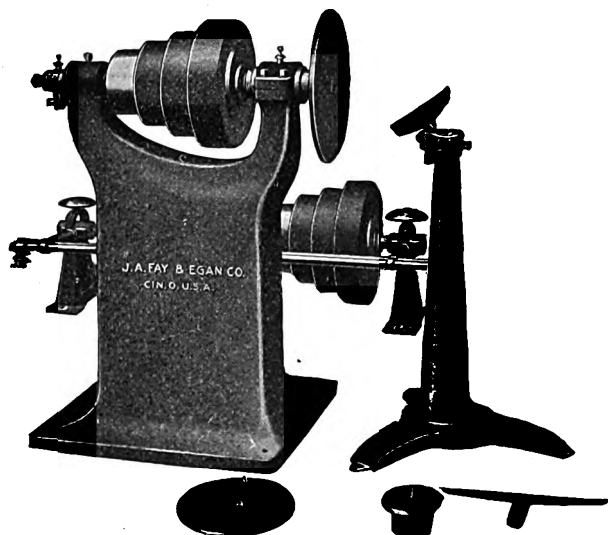
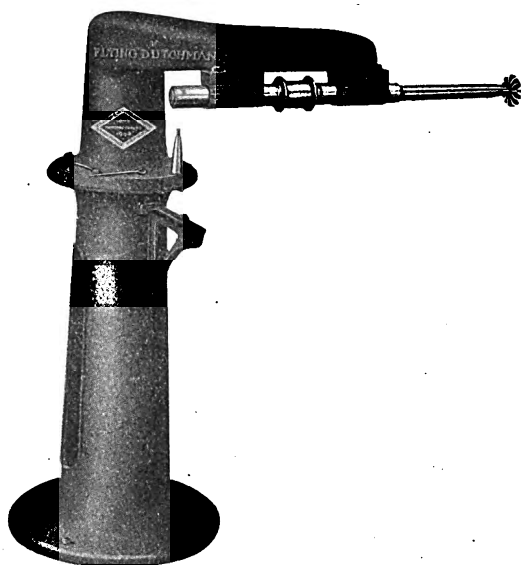


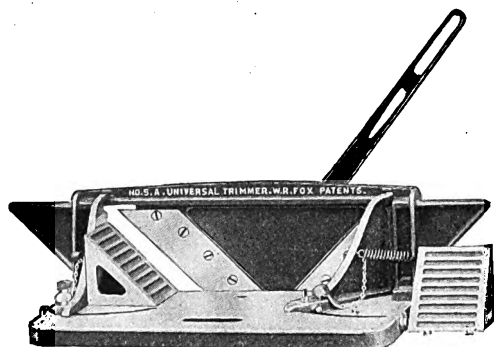
FIG. 3622



CARVER—FIG. 5104

FOOT POWER MITERS

Made in three styles: Hand Miters, Plain Foot Miters and Picture Frame Miters; cutting up to $2\frac{1}{4}$ inches, 3 inches and 4 inches.



TRIMMER—FIG. 3634

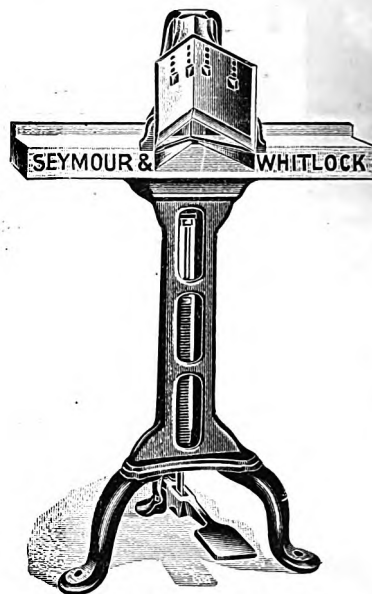
GANG DOVETAILER

Designed to meet the maximum requirements of manufacturers. Will produce regular, full round, plain blind, blind with dust-proof offset, or open type shell box dovetails. Works either straight or swell fronts without changing the set-up of the machine.

Made in two styles No. 201 with double cutting bits and No. 224 with eccentric cutters which will always make the same size of dovetail, regardless of how often they are sharpened. Made with 9, 12 and 15 spindles, taking up to 8, 11 and 14 inches wide respectively.

SPINDLE CARVERS

The machine illustrated is made in two sizes and can be furnished on column or without column to be used as bench carvers.



MITER—FIG. 5105

UNIVERSAL TRIMMERS

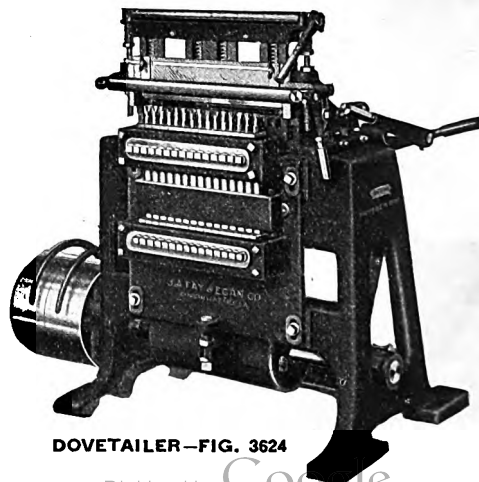
FOR PATTERNMAKERS, CARPENTERS, MANUAL TRAINING SCHOOLS AND INTERIOR FINISHING

MADE IN THREE TYPES—BENCH, LEG AND COLUMN

Bench Type made in three sizes: height of cut 4 inches, width of cut $8\frac{1}{4}$ inches; height of cut $4\frac{1}{4}$ inches, width of cut $8\frac{1}{4}$ inches; and height of cut 6 inches, width of cut $12\frac{1}{2}$ inches.

Leg Type made in two sizes: height of cut 4 inches, width of cut $9\frac{1}{4}$ inches and height of cut 6 inches, width of cut $12\frac{1}{2}$ inches.

Column Type made in two sizes: height of cut 6 inches, width of cut 19 inches and height of cut 8 inches, width of cut $24\frac{1}{2}$ inches.



DOVETAILER—FIG. 3624

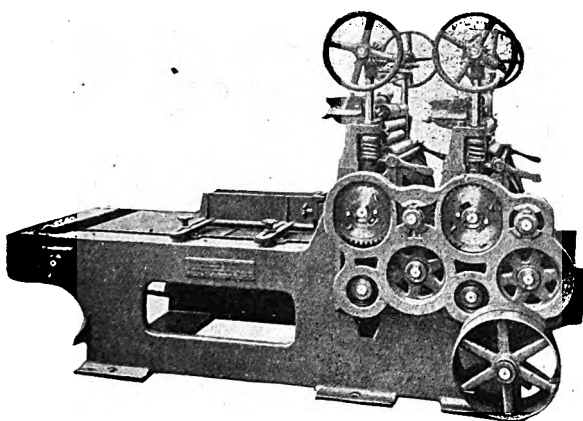


FIG. 3636

AUTOMATIC BOX CORNER LOCK MACHINE

This machine is intended to tenon box-stuff, and for other purposes where a strong corner is required. It will admit stuff from the narrowest up to 18 inches wide, any length, and will cut through 18 inches deep.

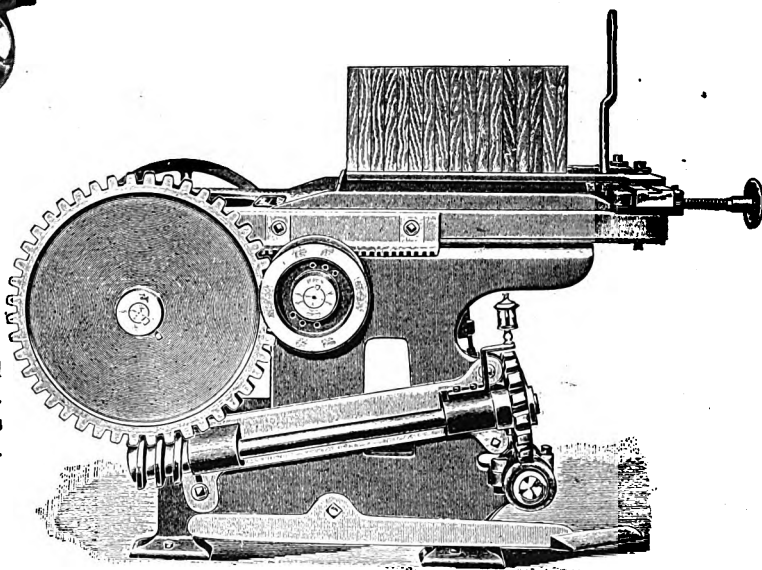


FIG. 3635

DRY KILNS

FOR DRYING LUMBER OF ALL KINDS

This cut illustrates but one of the many types of dry kilns that we are in position to furnish. We can furnish kilns for the drying of stock of all kinds. Built either for endwise or cross piling.

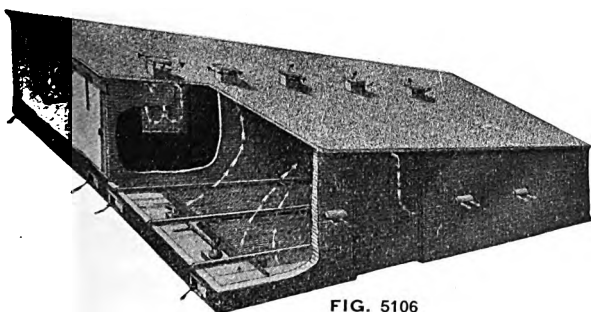
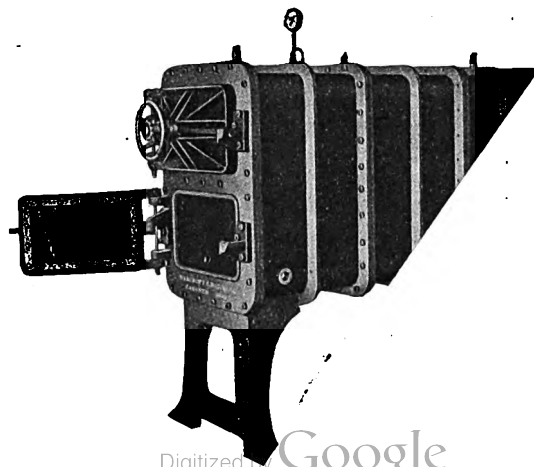


FIG. 5106

STEAMING RETORTS

This cut illustrates the latest improved steaming retort for preparing stock for bending. This retort is tight, which enables the factories using it to maintain a bending room practically free from steam. It is 24 inches wide by 36 inches high inside measurements. Can be furnished in the following lengths: 24, 36, 48, 60, 72, 84, 96 and longer when desired.

We can also furnish stock bending machines for all classes of work.



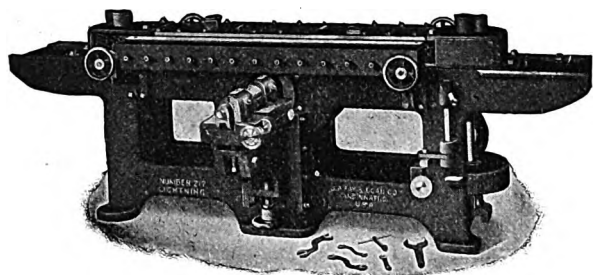


FIG. 3625

CONTACT STEAM GLUE HEATERS OR WARMERS

FOR BENCH OR INDIVIDUAL USE
MADE IN SIX SIZES: 1, 2, 4, 6, 8, 10 QUARTS

The object of these heaters is to have the glue handy at each cabinetmaker's bench and in condition at all times, so that there is no time lost in running back and forth in the shop for fresh glue.

The 1 and 2 quart capacities are regularly fitted with enameled glue pot and the larger sizes with galvanized iron glue pot but can be fitted with copper or aluminum glue pot if desired.



FIG. 3628

BELT POWER STIRRER FOR GLUE HEATERS OR COOKERS

The Power Stirrer is frequently preferred to the Hand Stirrer, especially for the larger sizes of heaters or Cookers. It is double-acting and is so geared as to require very little power. Fitted with tight and loose pulleys. Furnished with either copper or galvanized plate iron tank.

AUTOMATIC CONTINUOUS FEED GLUE JOINTER

Makes either straight, hollow or spring joints; works material $\frac{1}{4}$ to 3 inches thick and from 1 inch up to any width and 6 inches up to any length, also used for jointing tank stock for which special long adjustable table extensions are provided. Three feeding speeds.

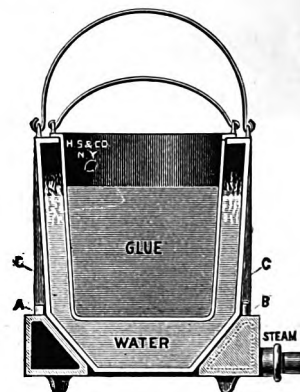


FIG. 3627

ALL COPPER AND BRASS GLUE HEATERS

FOR STEAM, GAS OR ELECTRICITY

Made in sizes with large pots of two gallons and small pots of one quart to sizes with large pots of five gallons and ten two-quart pots.

The large glue pot is regularly fitted with brass stirrer, copper cover, brass angle glue thermometer and brass glue valve. Each heater is also regularly fitted with brass water faucet, steam connections, four-leg stand, with drip pan. Heater may also be fitted with water gauge.

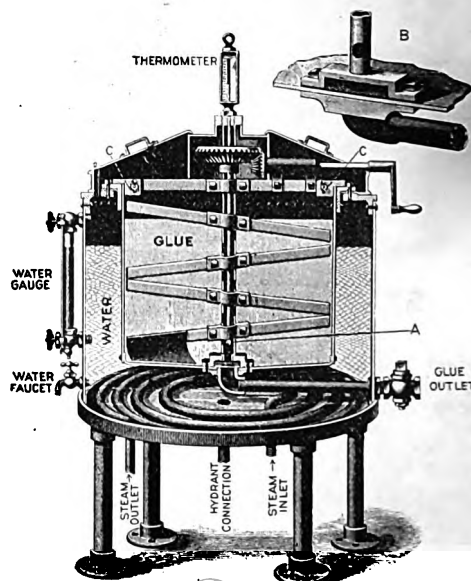


FIG. 3629

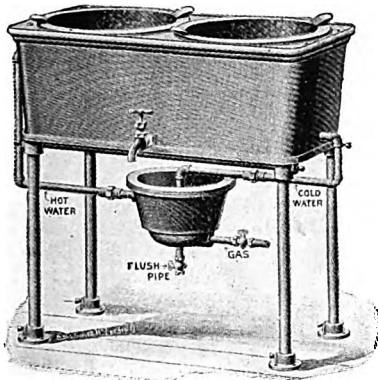


FIG. 3626

GAS WATER HEATER FITTED TO GLUE HEATER

Recommended for any Portable Glue Heater, as it is thoroughly reliable, safe, economical and convenient. As the glue is heated by water circulation it is impossible for the glue to burn.

POWER FEED GLUE SPREADERS

FOR ANIMAL HIDE GLUE

Regularly made in seven widths: 12, 18, 25, 31, 37, 44 and 75 inches.

Three Styles: Single, Double and Combination.

The capacity is limited to the ability of the operator in handling the stock, and the nature of the work—about 4000 lineal feet per hour is the usual feed. Designed to cover all the usual requirements in thickness and variety of glued work on curved or straight stock.

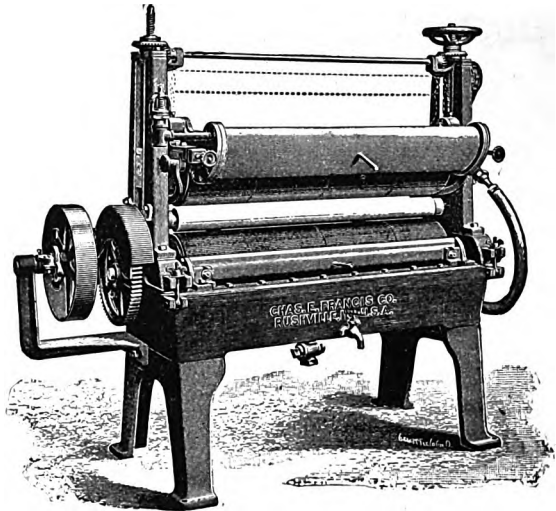


FIG. 3630

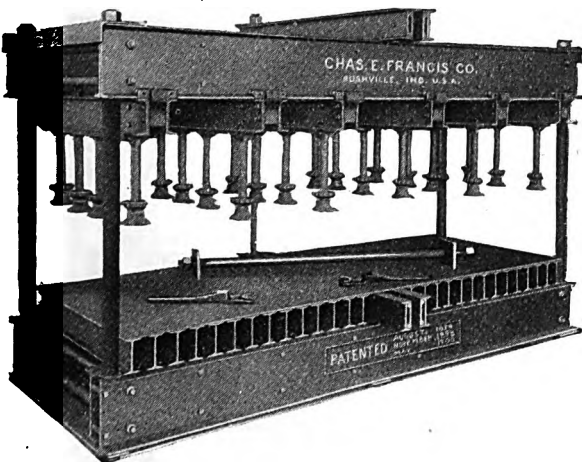


FIG. 3631

STEEL COMPLETE GLUE OR VENEER PRESSES

This cut shows one of the patented steel complete glue and veneer presses which can be furnished in almost any size for any class of work.

SINGLE BEAM RETAINING CLAMPS

FOR USE IN SCREW PRESSES, HYDRAULIC PRESSES, ETC.

Made in seven sizes taking stock from 18 up to and including 48 inches wide.

By their use the capacity of the press can be made practically unlimited as each set of clamps is made to answer practically the purpose of another press.

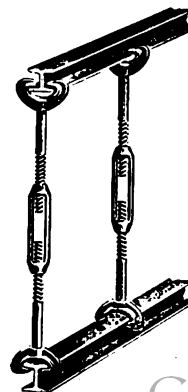


FIG. 3632

SINGLE DRUM CRABS

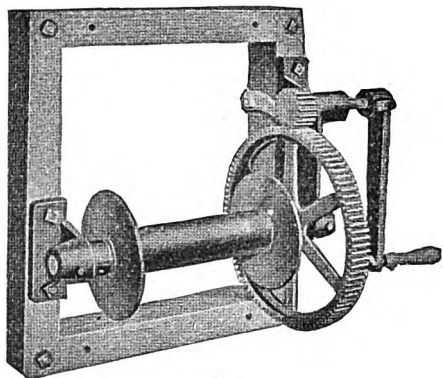


FIG. 5108

CAPACITIES 900 AND 1200 POUNDS

Designed especially for use in garages for lifting the motor, transmission and the bodies from automobiles. Also for use in stores and warehouses for handling goods of all kinds. Can be fastened to a post or to the side of the building where it is out of the way.

AMERICAN SINGLE PURCHASE FOR MANILA AND WIRE ROPE CAPACITIES 1½, 2 AND 3 TONS

Nos. 1 and 3 for Manila Rope; No. 12 for Wire Rope.

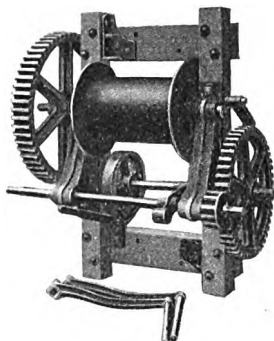


FIG. 3746

AMERICAN DOUBLE PURCHASE FOR MANILA AND WIRE ROPE CAPACITIES OF 2½ AND 4½ TONS

This class of crab is very powerful when used in its strongest gear; by slipping the cranks on the intermediate shaft the crab has less power and is adapted for lighter and quicker work. For winding up slack rope quickly a crank may be used on the drum shaft. It has a friction brake for lowering.

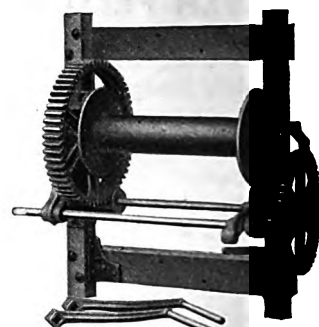
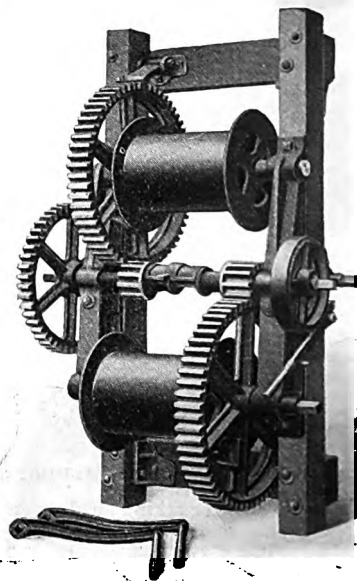


FIG. 3747

AMERICAN DOUBLE DRUM, DOUBLE PURCHASE WIRE ROPE CRABS

CAPACITIES 2½ TO 5 TONS

This class of Crab is very powerful, capable of handling the boom of a derrick with its load. If lighter, quick work is required the crab is quickly adapted to the work by slipping the cranks onto the intermediate shaft. For winding up slack rope rapidly crank can be used direct on drum shaft. These crabs have powerful friction brakes and dogs.



Digitized by Google FIG. 3748

AMERICAN DOUBLE DRUM ELECTRIC CRAB

CAPACITY 5000 POUNDS

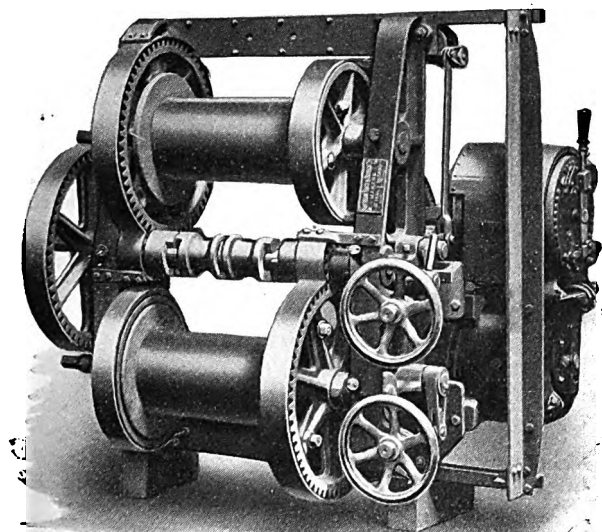


FIG. 5109

Designed to bolt to the mast of a derrick in the same manner as a hand crab. Crank handles are supplied and drums may be operated by hand power should current fail. The construction is of steel and iron throughout. Two drums are provided for operating both lines of a derrick. A five horse-power motor of type to suit current available is supplied.

Only one drum can work at a time. Each drum is operated by a jaw clutch, which may be engaged with either drum, as desired, or which may be disengaged from both drums. To raise a load, simply throw in the clutch and start the motor. The load is picked up and hoisted without a jerk. To lower the load, it is only necessary to turn the hand-brake wheel—each drum being so equipped; the action is simple but sure. When the motor is stopped or current accidentally cut off, automatic brake applies itself and holds the load in safe suspension until operator desires to lower it. Lowering may be accomplished without jar.

AMERICAN STANDARD IRON FRAME HAND WINCHES

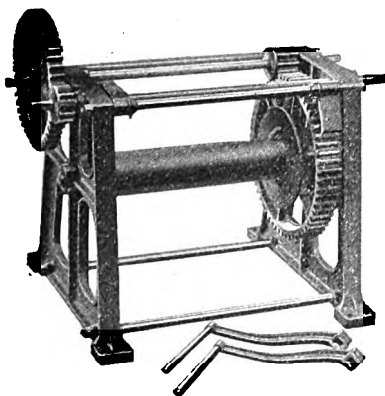


FIG. 3749

These cuts illustrate the American Standard Iron Frame Hand Winches of Portable Form, Single and Double Purchase, suitable for Manila and Wire Rope.

Capacities $2\frac{1}{2}$ and $4\frac{1}{2}$ tons, strain on single line with a man at each crank. Two cranks furnished with each winch.

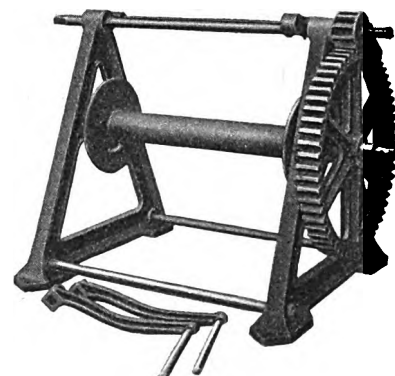


FIG. 3750

SINGLE DRUM PORTABLE HOISTS

CAPACITIES 500 TO 2000 POUNDS

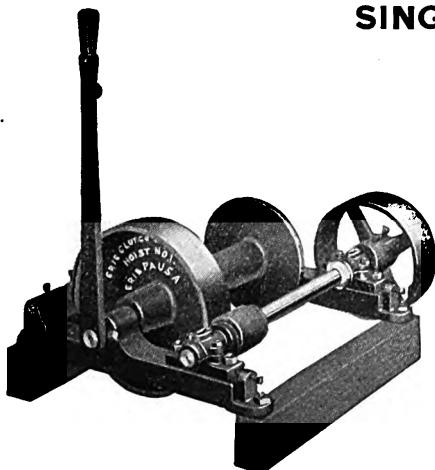


FIG. 5110

These hoists have been designed for general contracting and building use, for raising building material, hauling sand, concrete, lumber, etc., up inclines. Also used in many factories for handling heavy material. Can be fastened anywhere and be driven by an electric motor, gasoline or kerosene engine, or from a line shaft.

DOUBLE DRUM HOISTS

CAPACITIES 1000 AND 2000 POUNDS

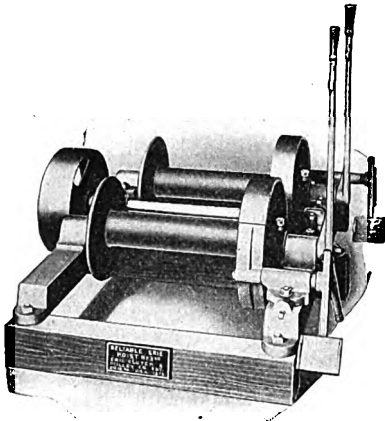


FIG. 5111

Especially designed to hoist in two places or in different parts of the building. Each drum is independent of the other. They are similar in construction to the single drum hoists on page 849. They require one engine or motor for power, and one man to operate them. Two hoists in one, with the running expense the same as the single drum machine.

1000 pound hoist requires 4 H.P.

2000 pound hoist requires 6 H.P.

AMERICAN BELT HOISTS

Can be furnished Single or Double Drum. Capacities 2000 and 6000 pounds. Can be run from a line shaft or by an independent motor, steam or gasoline engine, stationary or portable.

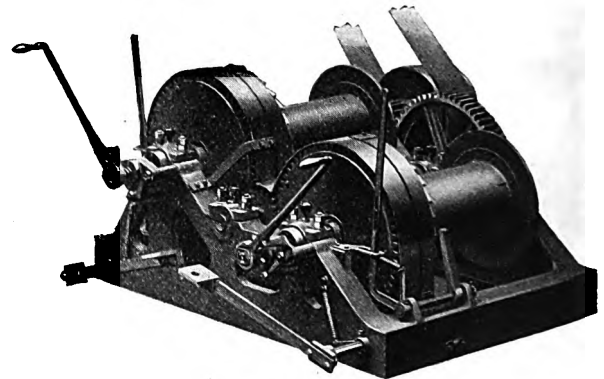


FIG. 3727

AMERICAN ELECTRIC HOISTS

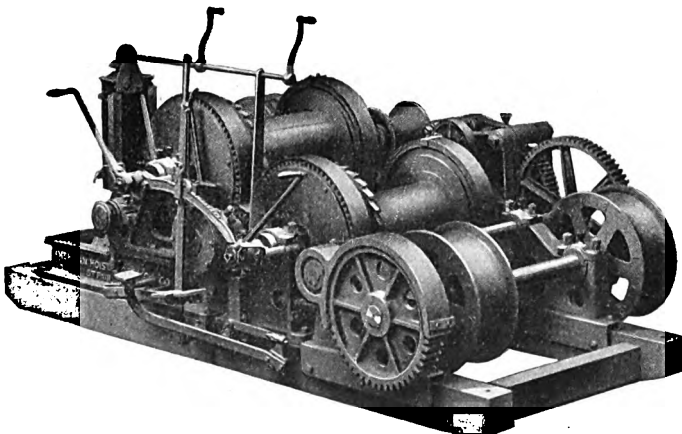


FIG. 3726

Can be furnished with or without motor with 1, 2, 3 or 4 Drums. When ordering complete with motor for Alternating Current state Voltage, Cycles and Phase. For Direct Current state voltage.

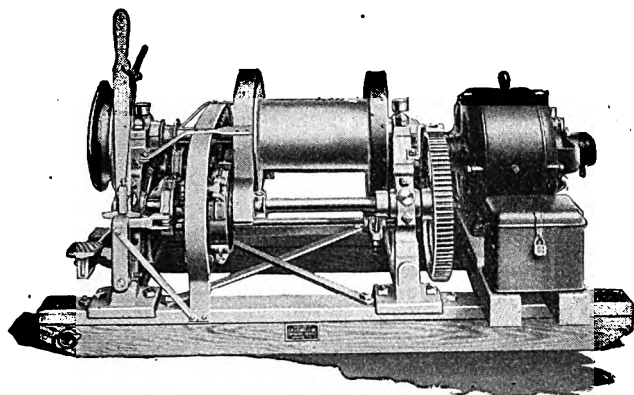


FIG. 3729

THE C. H. & E. MOTOR DRIVEN DOUBLE ACTING BUILDERS' HOIST

MADE IN FOUR SIZES, 5, 7½, 10 AND 15 HORSEPOWER

For hoisting lumber, brick and mortar.

All hoists, whether engine or motor driven, are tested and made to develop the guaranteed load to be lifted, before shipping the outfit.

All machines are wired from the motor to the switch or starter which is mounted securely on the machine.

THE C. H. & E. ENGINE DRIVEN DOUBLE ACTING BUILDERS' HOIST

MADE IN TWO SIZES, 5 AND 7 HORSEPOWER

Can be furnished either kerosene engine or motor driven; meets every requirement for large or small jobs. Designed for use of contractors, in elevating material and back-filling ditches, mining operations, loading logs, pile driving, etc.

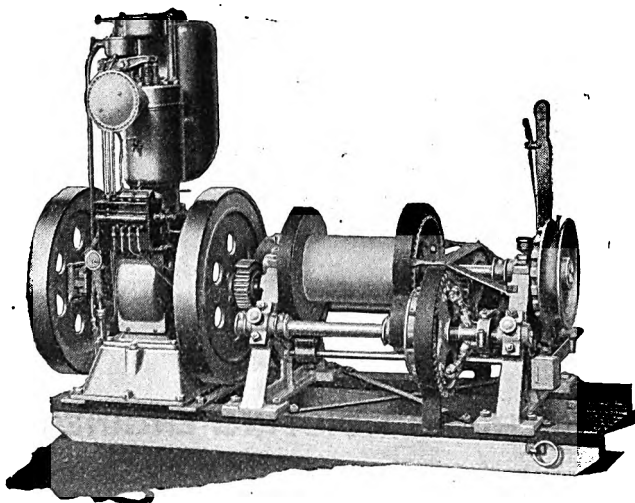


FIG. 5113

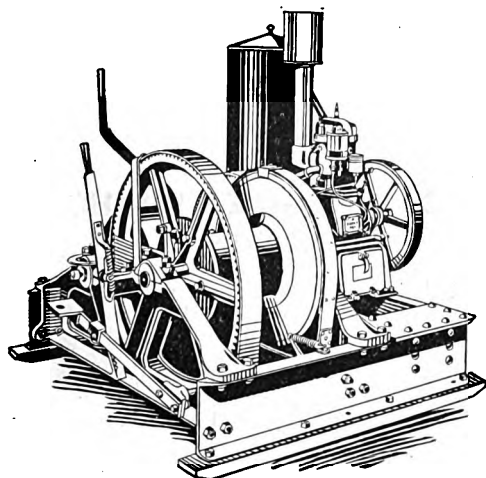


FIG. 5112

THE AMERICAN KEROSENE HOIST

An ideal hoist for the general contractor who has a variety of shifting contracts with a large number of small hoisting jobs, which do not justify purchasing a big hoisting engine. Simplicity of design and construction are its most distinguishing features. Has a 6 H.P. kerosene engine. Will handle a working load of 4,000 pounds on a single line. Combined weight of hoist and engine only 2,000 pounds. Has a hand brake with brake band of large diameter, which safely holds all loads up to the capacity of the hoist.

AMERICAN DOUBLE DRUM REVERSIBLE BUILDERS' HOIST

Fig. 5114—Designed to meet the needs of the general contractor as well as the builder. Instantly starts with a strong, steady pull. Its weight and size permit of easy moving as work progresses, or from one job to another. Two friction drums are independent of the elevator sheave and may be employed for operating the boom and fall lines of a derrick. Each has great capacity on single line and can hoist or lower heavy loads of timber, structural steel, or stone; or do moderately heavy pile driving. A fixed winch head is keyed to the front drum shaft. Engine is reversible.

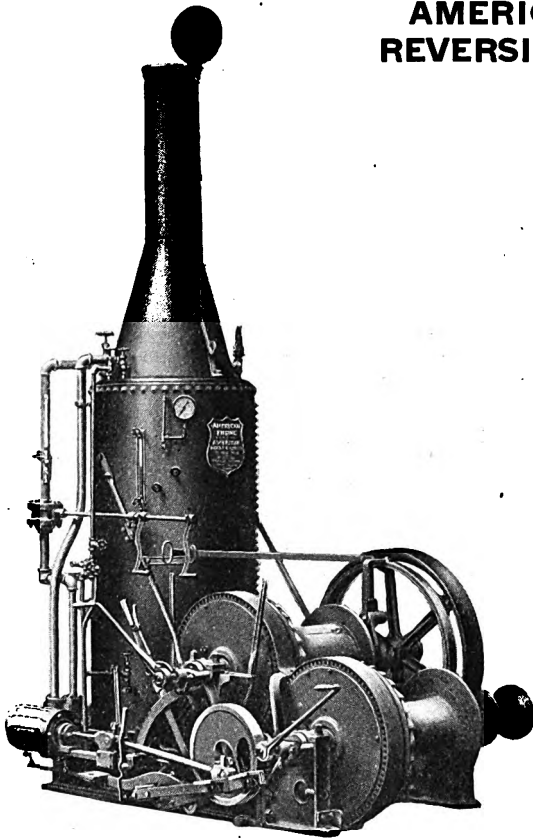


FIG. 5114

AMERICAN HOISTING ENGINES

The type of engine shown in Fig. 3724 is the one most favored for general contract work.

Made in the following sizes: $5\frac{1}{2} \times 8$; $6\frac{1}{4} \times 10$; 7×10 ; $8\frac{1}{4} \times 10$; 9×10 and 10×12 ; 1, 2, 3 or 4 Drums.

For derrick work this engine is used with either an American Disc Slewing Attachment or an American Double Cylinder Reversible Steam Slewing Attachment. An extra drum can be added if desired.

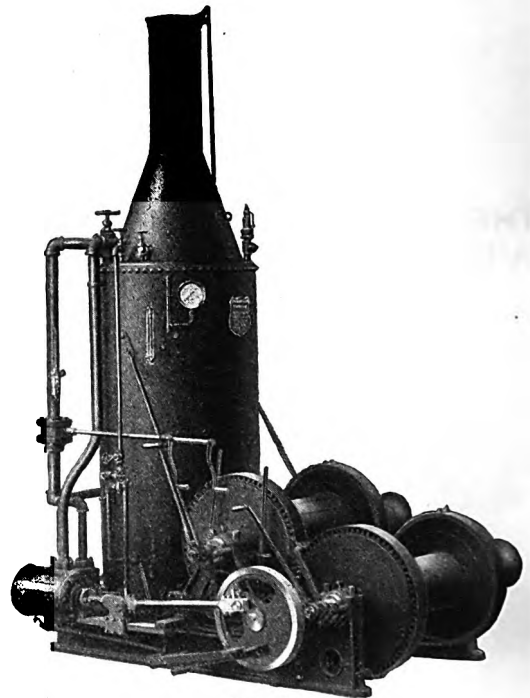


FIG. 3724

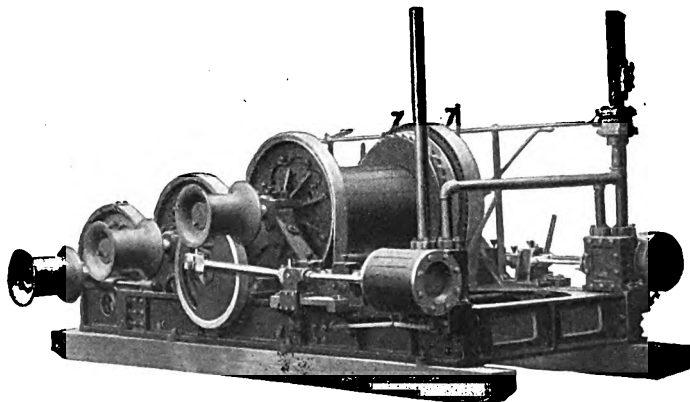


FIG. 3725

AMERICAN ENGINES WITHOUT BOILERS

Where it is impossible to use the regular American Upright Boiler in connection with a Hoisting Engine, or where steam can be obtained more economically from some other source, or where compressed air is to be used instead of steam, an American Engine without boiler, as shown in this illustration is recommended. This illustration represents a 9×10 Standard Engine Frame.

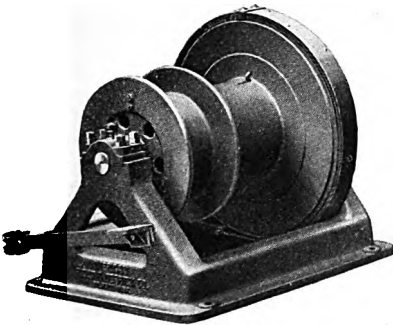


FIG. 5115

AMERICAN COUNTERWEIGHT LOWERING DRUM

FOR ORANGE-PEEL OR CLAM-SHELL WORK

In order to operate an orange-peel or clam-shell bucket, and raise or lower the boom of your derrick at the same time, an American counterweight lowering drum in connection with a double-drum engine may be used for doing almost the same work as a three-drum hoist. It may be applied to a guy or stiff leg derrick, floating barge, full circle excavator or traveling crane. Can be placed wherever the operator can handle it conveniently in connection with the hoist. It can also be used for controlling cars on a gravity incline.

When ordering, state weight of load to be handled.

AMERICAN INDEPENDENT SLEWING ENGINE

All motions are controlled by the throttle lever. Starting, stopping and reversing are instantly and smoothly accomplished by the movement of this lever alone. Power may be graduated from a very slow or slight effort to full power or speed, either direction, simply by moving the slewing throttle lever backward or forward as far as needed. Derrick with a bull wheel but having a hoist that cannot be fitted with a slewing attachment, will accomplish the best of which it is capable with the slewing engine. Almost any derrick plant arranged for a hoisting engine can be fitted with a bull wheel. This slewing engine with a bull wheel greatly increases the output.

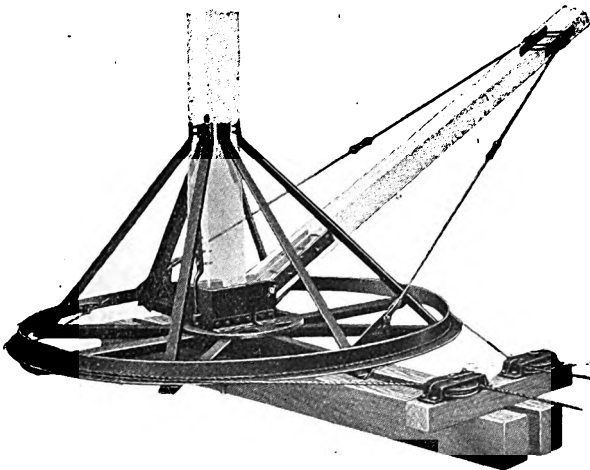


FIG. 3733

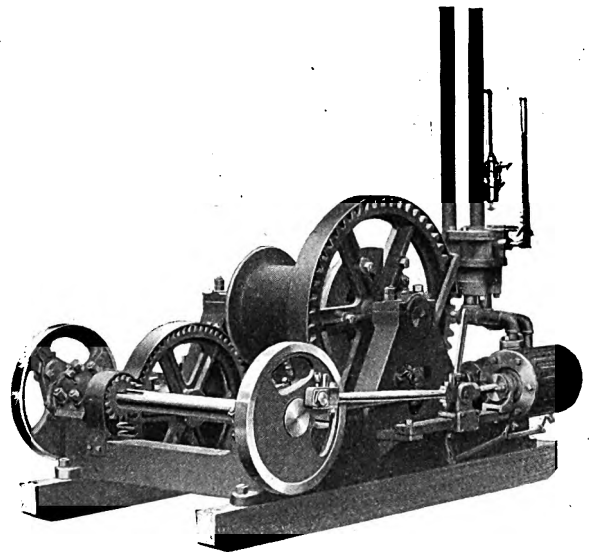


FIG. 5116

AMERICAN BULL WHEELS

MADE IN THREE SIZES: 8, 12 AND 16 FT.

Are made entirely of steel and are furnished complete with all braces, tension rods and guide sheaves. Center plates can be furnished to fit any standard American Mast Bottom. These are the strongest Bull Wheels on the market and can be readily attached to any type of American Derrick Irons.

DAKE SWINGING GEAR

WITH REVERSING ENGINE AND COMPOUND GEARING FOR SWINGING BULL WHEEL DERRICKS

Made in the following sizes:

Size number—Type.....	3S	3½S	4S	5S
H.P. of Engine.....	5	7	10	15
Speed per minute, feet.....	30	30	29	25
Weight lifted, single line, lbs.....	4,125	5,775	8,839	14,850

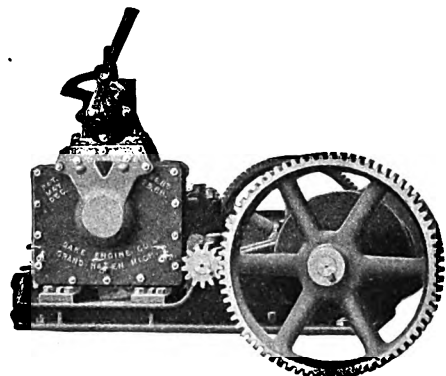


FIG. 3734

AMERICAN GUY DERRICKS

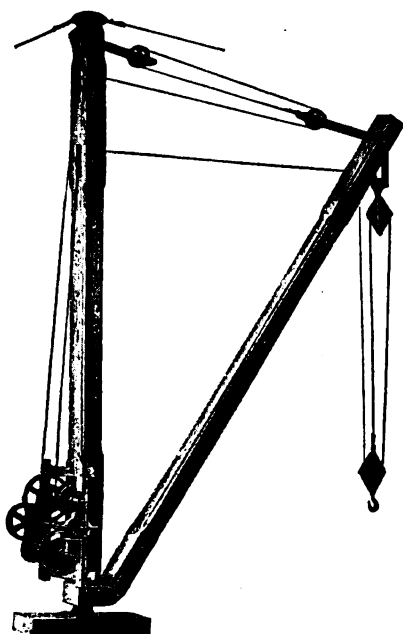


FIG. 3730

Fig. 3730 shows a guy derrick designed to be operated with a hand power crab, using either manila or wire rope. This is the simplest type of guy derrick and is well adapted for use in stone-yards, small material yards, etc. We are also prepared to supply guy derricks of any capacity with wooden masts and booms, or steel masts and booms, for all kinds of material handling and excavating work.

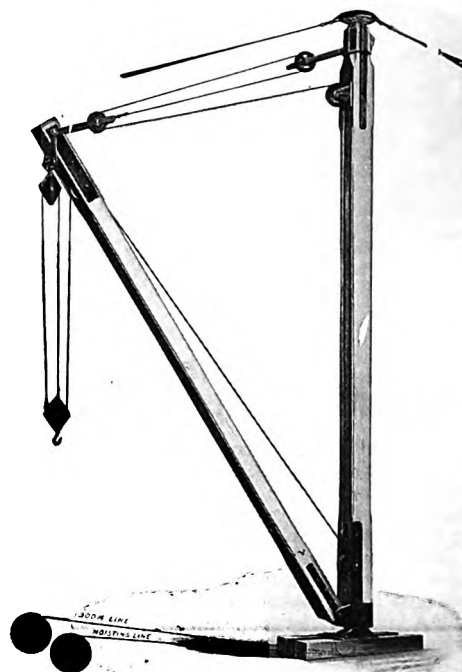


FIG. 3731

Fig. 3731 meets the demand of the most exacting engineer, contractor or quarryman. It is simple in design and easy to construct. American Bull Wheels are readily attached and are strongly recommended because they greatly increase the derrick's efficiency, without any increase in operating cost.

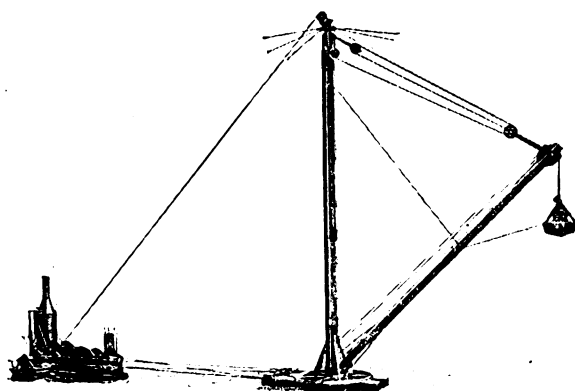


FIG. 5117

FOR CLAM-SHELL OR ORANGE-PEEL BUCKET WORK

This arrangement permits the operator to change the boom radius while bucket is being raised or lowered, and material is properly delivered without any loss of time. The boom line leads over the rooster on the mast top, direct to the engine drum, avoiding entirely the possibility of fouling with the bucket lines, which lead from the foot of the mast, when derrick revolves.

AMERICAN STEEL GUY DERRICKS

For large construction and material handling jobs where the service is very severe a steel derrick is recommended for the reason that the strength of a steel mast or boom can always be accurately determined, while the strength of even the best looking timber is always a matter of some uncertainty. The mast and boom of a steel derrick can be made up in lengths

that will permit their being loaded on a single flat car. This not only adds much to the convenience of handling but effects a very pronounced saving in transportation charges. Another advantage is that the mast and boom can be made any desired length, overcoming the trouble often experienced in obtaining long timbers.

AMERICAN STIFF LEG DERRICKS

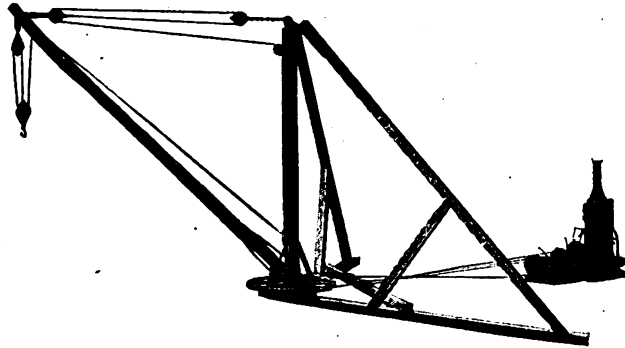


FIG. 3732

In situations where it is impossible to run guys and where the work can be confined to swinging the boom about three-quarters of the circle, this type of derrick has a number of advantages. In addition it is easily erected or moved, and can use a very long boom. This type of derrick is made either to be operated with a hoisting engine with a bull wheel for swinging the boom, or it can be operated by a hand power crab; or the hoisting line can be worked by a horsepower and the boom radius varied with a handpower crab fastened to the back of the mast. This type of derrick is particularly valuable as a part of the permanent equipment of plants handling sand, crushed rock, etc., as it can be mounted as a traveler and thus cover much more ground than a guy derrick could. This is the general type of derrick that is used on barge derricks, though the irons furnished for barge use are considerably different in design, owing to the fact that it has been necessary to provide for the additional strains caused by the tilting and swaying of the barge when handling heavy loads. Stiff Leg Derricks can be furnished to suit any situation or kind of service.

FOR CLAM-SHELL OR ORANGE-PEEL BUCKET WORK

Where it is impossible to run guys and where the work can be confined to swinging the boom about three-quarters of the circle, this derrick is desirable on account of its being easily erected or moved, and its ability to use a long boom. The boom line leads over the rooster on the mast top, direct to the engine drum, avoiding all possibility of fouling with the bucket lines, when derrick revolves.

With all orders we furnish full directions for fitting the woodwork, giving lengths of timbers, distances, etc.

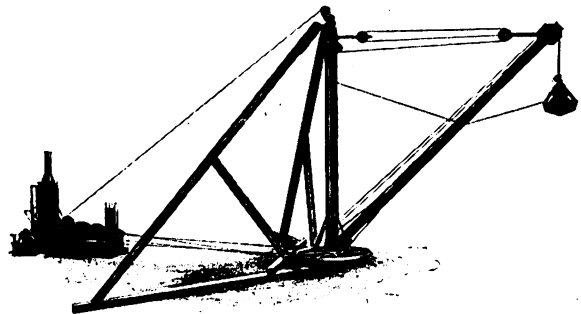


FIG. 5118

HORSE WHIMS

FOR GENERAL CONTRACT AND MINING WORK

This machine is provided with duplex motion, whereby light loads can be hoisted quickly and heavy loads slowly, the change from quick to slow being instantly made by the movement of a lever from left to right.

When used for mining work an attachment is provided which enables the power to be controlled by levers outside of the ring in which the horse travels, enabling the operator to watch proceedings down the shaft, and also tend bucket at the mouth.

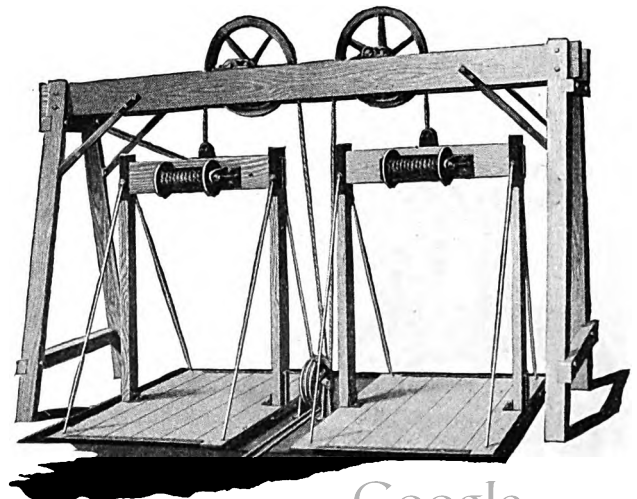


FIG. 3739

DOUBLE CAGE MATERIAL ELEVATOR

For rapid handling of building material such as brick and mortar, these elevators are indispensable to the contractor. The head or top frame which supports the two sheave wheels is strongly bolted and well ironed off to stand the wear and tear on the job. The two cages are large and well braced with platforms made of sound well-seasoned maple.

WARRINGTON PATENT IMPROVED STEAM PILE HAMMER

MADE IN FIVE SIZES: NOS. 0, 1, 2, 3 AND 4

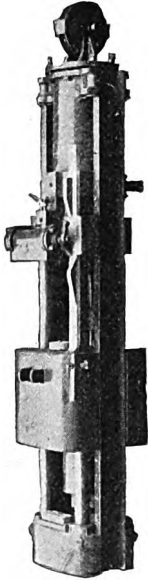


FIG. 3768

The No. 0 is used for 18-inch and 20-inch wooden piles and for 16-inch to 20-inch square or round concrete piles.

The No. 1 is used for 14-inch to 16-inch wooden piles and for general foundation work.

The No. 2 is used for 12-inch and 13-inch wooden piles and for general railroad work.

The No. 3 is used for 9-inch to 10-inch wooden piles and largely for wooden sheeting.

The No. 4 is used for driving fish stakes for pond nets along the shore and in connection with sheeting cap, for small wooden sheeting.

For driving wood or steel sheeting all the hammers are used with sheeting caps. Hammers are now equipped with three different forms of bases, all of which are interchangeable:

1. The regular or solid form, which has a conical recess to fit over and rest on the head of the pile and which is used for all ordinary requirements in driving and in connection with sheeting caps.

2. The open end base, for sheet piling.

3. A special form, known as the McDermid Base, from its patentee.

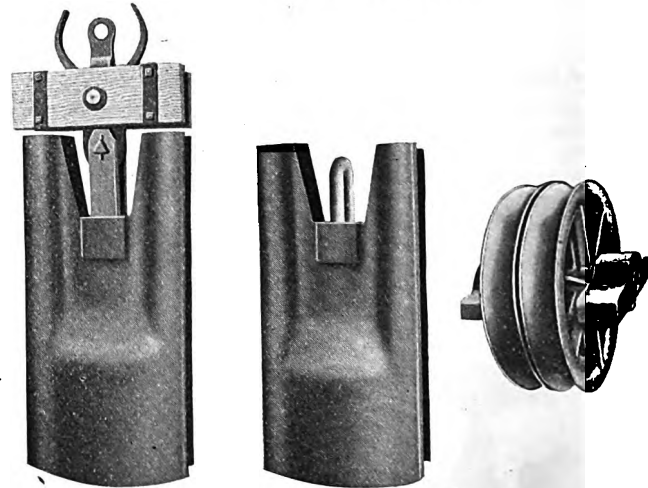


FIG. 3769

PILE DRIVER HAMMERS

Can be furnished in sizes 1000, 1200, 1500, 2000, 2500 and 3000 pounds.

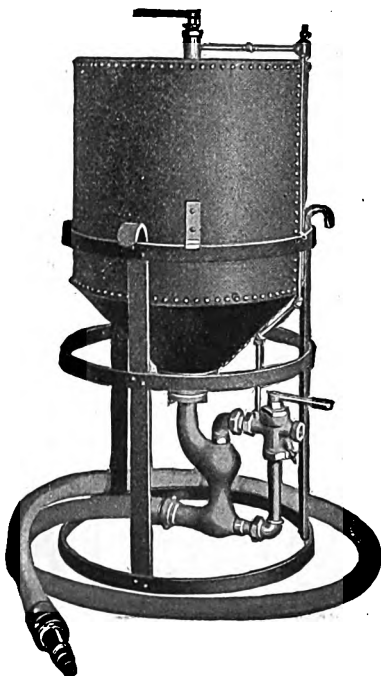


FIG. 3770

THE INJECTOR SAND BLAST

Indispensable for cleaning all castings and for any other sand blasting, as removing heat scale from forgings, gears, etc., cleaning bridges, steel railroad cars, etc. Easily operated with low or high air pressures, giving a steady, efficient blast with greatest economy of sand and air. Strongly built and durable.

Made in six sizes as follows:

12x12-inch—capacity	60 pounds.
16x30-inch—	300 "
24x24-inch—	500 "
30x36-inch—	1200 "
36x36-inch—	2000 "
42x51-inch—	4000 "

AMERICAN HAND STEERERS

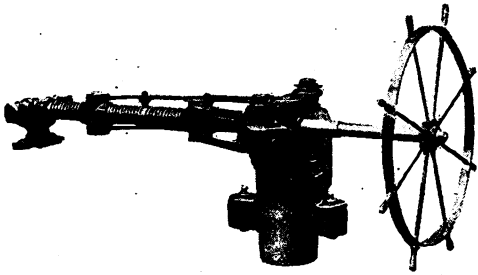


FIG. 5119

AFT BEARING TYPE

Bronze nuts operate steel connecting rods. Double pin connections provided. End coupling for rudder shaft furnished by manufacturer if desired.

WHEEL AND COLUMN

Has horizontal shaft set under base. Diameter steering wheel 48 inches over all. Mahogany wheels with locust spokes. Maximum bowl diameter $10\frac{1}{2}$ inches. Gearing arranged in bowl so that needle gives the exact angle assumed by rudder which is an extremely important point when ship is entering harbor or is in waters where accurate steering is necessary.

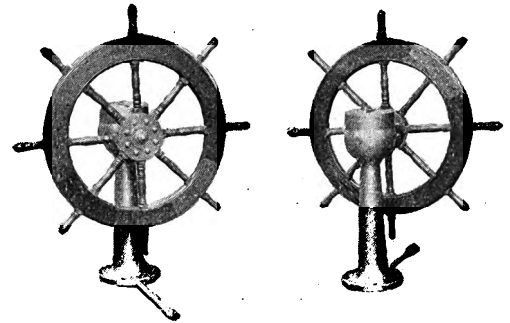


FIG. 5120

AMERICAN STEERING ENGINES

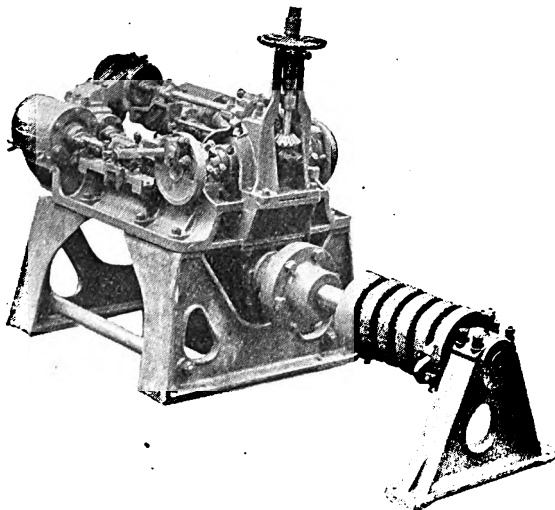


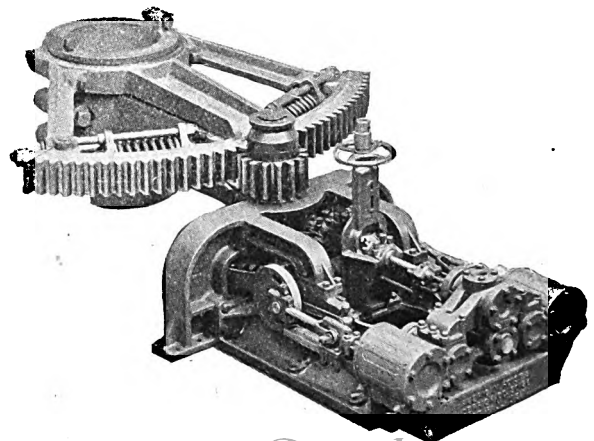
FIG. 5121

DRUM TYPE

7 x 7 chain, drum type, high bracket reversing throttle.

QUADRANT TYPE

Quadrant type, piston valve and throttle.



AMERICAN CARGO WINCHES, ANCHOR WINDLASSES, ETC.

We are prepared to figure with shipbuilders on supplying deck machinery for the ships they build. American Cargo Winches, Anchor Windlasses and Steering Engines are built by one of the best known manufacturers of material handling machinery in the country, and are being used extensively by many shipbuilders in various parts of the country.

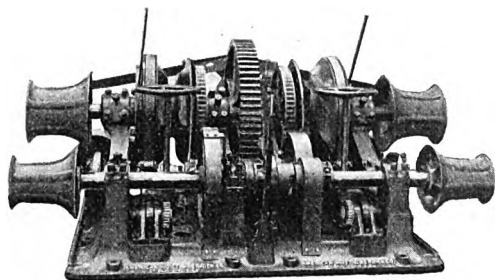


FIG. 3735

ANCHOR WINDLASS

8x8 Double Cylinder Piston Valve Anchor Windlass, for $1\frac{3}{4}$ and $2\frac{1}{2}$ inch chain. Illustration shows front view of the machine. Weight 18,947 pounds.

CARGO WINCH

7x12 Double Cylinder, Single Drum, Reversible Cargo Winch, Single Geared; 4 winch heads; right-hand operating levers. Illustration gives a rear view of the machine. Weight 6480 pounds.

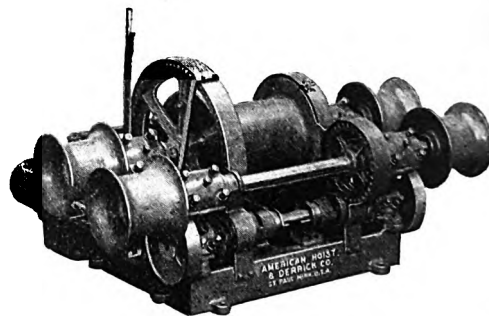


FIG. 3736

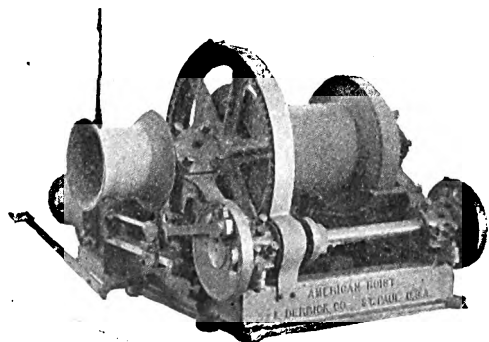


FIG. 5123

CARGO WINCH

Single geared reversing throttle one winch head on operating side, left hand operating levers.

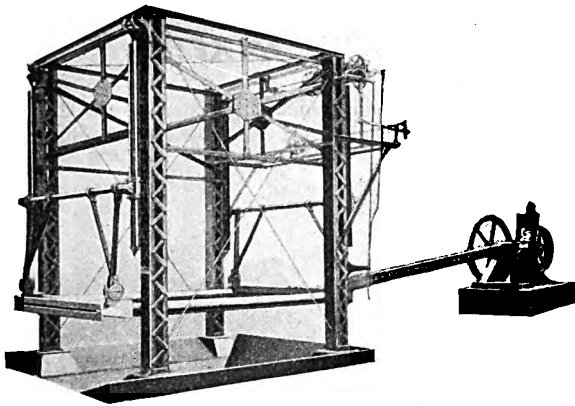


FIG. 3765

PATCH GANG SAWS

This cut illustrates one type of the improved Merriman Screw Gang Saws.

The standard size of gang saw will saw a block 10 feet long, 6 feet wide and 6 feet high. We are prepared to furnish these machines to cut blocks of any size.

WEIGHTS OF GANG SAWS

Gang Saw Irons, standard size.....	15,500 lbs.	Contents, 385 cubic feet.
Gang Saw Irons, with steel frame.....	22,500 lbs.	Contents, 525 cubic feet.
Gang Saw Irons, with wood frame.....	25,500 lbs.	Contents, 525 cubic feet.
Gang Saw Truck Irons.....	1,000 lbs.	Contents, 5 cubic feet.
Gang Saw Truck Irons, with wood frame.....	2,000 lbs.	Contents, 22 cubic feet.
Gang Saw Truck Irons, with steel frame.....	2,200 lbs.	Contents, 22 cubic feet.

PATCH MARBLE POLISHING MACHINES

This Polishing Machine has a radial swing of 1'8", and is adapted for general marble polishing and for light work in granite. The machine has a vertical adjustment of 3 feet, and is raised and lowered by power through accurately machine cut spur gears. This is accomplished quickly without noise.

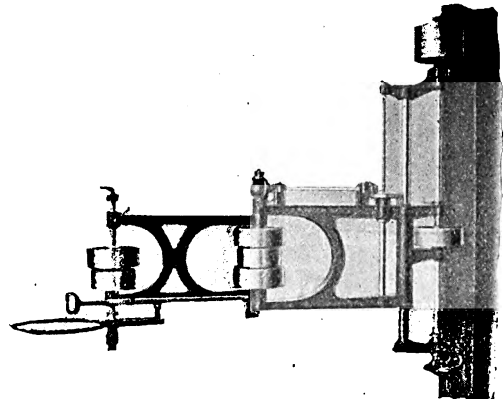


FIG. 3766

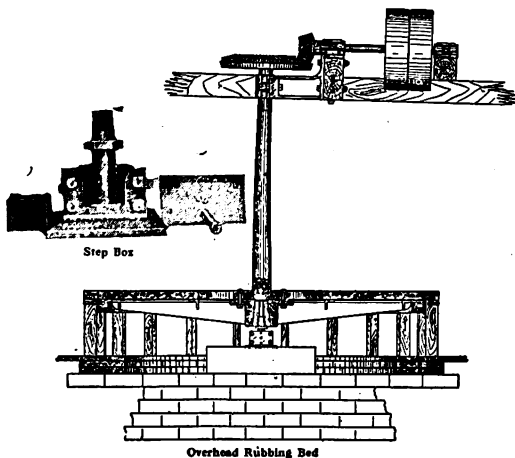


FIG. 3767

PATCH RUBBING BEDS

OVERHEAD RUBBING BED

This is the latest and most improved style of construction for overhead driven Rubbing Beds. We can furnish this machine in all sizes from six to fourteen feet in diameter.

DRUM TYPE BATCH MIXERS

These cuts show a few types of what is commonly known as the drum type Batch Mixer. These machines will thoroughly mix concrete, grout, facing, mortar or plaster of any consistency.

Ideal machines for foundation and gutter work.

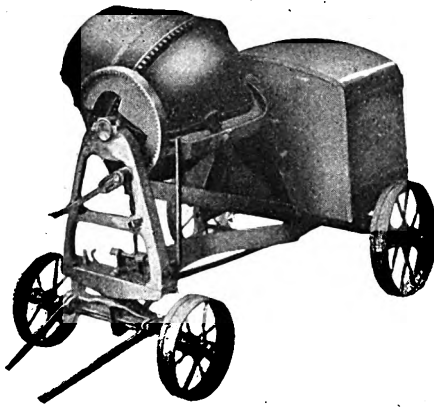


FIG. 3761
MOUNTED ON TRUCKS WITH ENGINE AND HOUSING

Can be furnished on steel or wood skids, hand or power. Mounted on portable hand trucks.

Mounted on trucks with Gasoline Engine and with or without Side-Loader, Hoist or Water Tank.



FIG. 3762
MOUNTED ON TRUCKS WITH ENGINE HOUSING AND SIDE LOADER

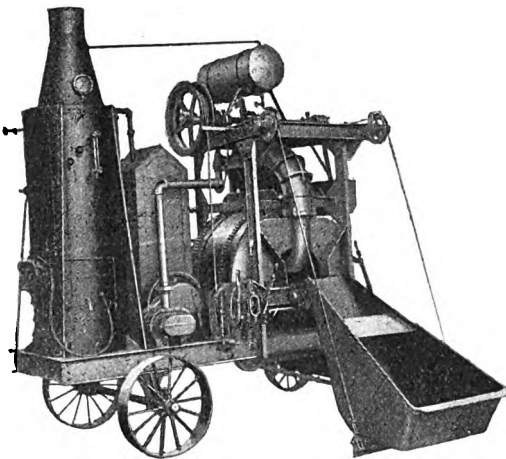
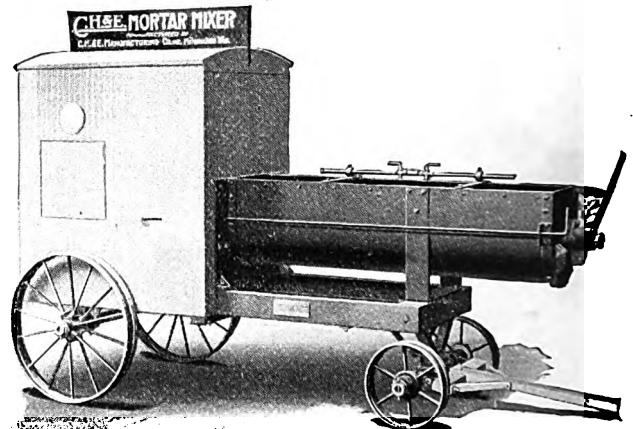


FIG. 3763

KOEHRING HOT MIXERS

Koehring Hot Mixers are combination heating plants and mixers for bituminous road mixtures, sheet asphalt, rock asphalt, mastic floor and for cement concrete. Combustion takes place in double burner oil furnace with brick lined chamber, and lined conduit. Heated gases and air are injected into drum by blower. Fuel oil or kerosene may be used. To use as Hot Mixer, make connection with blower and asphalt tank; to use with concrete cement, disconnect asphalt tank and blower and connect water tank.

Side Discharge Type and End Discharge Type.



THE C. H. & E. MORTAR MIXER

The Mortar Mixer is supplanting the old fashioned hoe and mixing box in the same way that the modern concrete mixer has replaced the shovel and mixing platform. This mixer will supply and keep busy from thirty to forty brick-layers.

KOEHRING "DANDIE" MIXERS

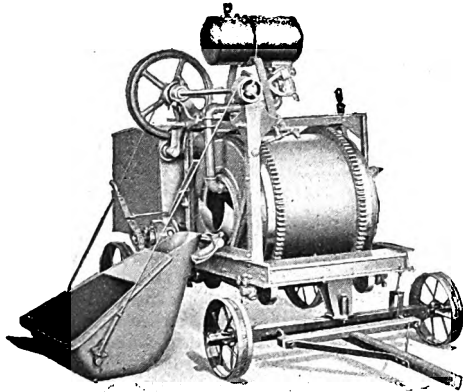


FIG. 3752

NO. 104S WITH CHARGING SKIP AND WATER TANK

A light mixer which is first of all built for highest mixing ability and dependability—and then built in the big volume by standardized methods of manufacture which keeps the price down and quality up. The result is, not the lowest priced mixer built, but a machine that holds a special place for dependability and long service in the light mixer field, at a price well within the price range of other machines in this field—in other words, it is the **Remarkable Value**.

Scientific design takes the place of weight. It is built by the leading manufacturers of big-capacity, heavy-duty mixers, and many features of heavy-duty construction are incorporated into these lighter mixers.

This great increase of stand-up ability in a light weight, easily portable machine, supplies a dependable mixer without great investment, both for the small and big contractor—the small contractor who requires a dependable mixer for general work such as culverts, footings, sidewalks, curbing, or any other work within the range of a mixer with a capacity of 4 and 7 cubic feet of mixed material—and also for the large contractor who sometimes needs several easily portable mixers to do a variety of miscellaneous jobs that are too small for his big capacity mixers.

MADE IN TWO SIZES: 4 AND 7
CUBIC FEET MIXED CONCRETE
PER BATCH

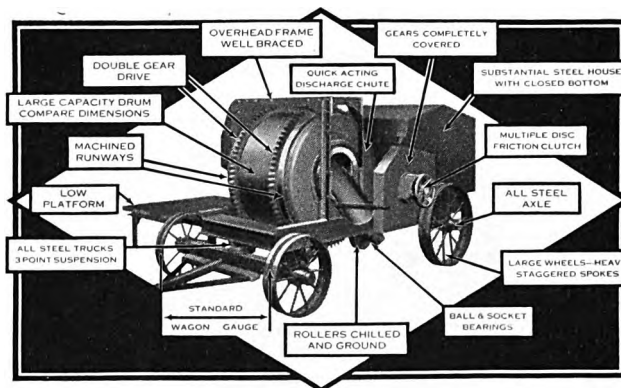


FIG. 3751

THE BIG VALUE IN A LOW-
PRICED LOW CHARGING MIXER

Equipment with the Koehring Dandie mixer provides the right outfit for any character of work. For direct wheelbarrow charging, a wide, open charging hopper with large platform—a batch hopper bin with gate into which materials can be shoveled or fed by gravity, or a high-speed pivoted charging skip can be supplied. Where water under pressure is available the Koehring automatic water measuring tank regulates water for each batch, and when a light duty hoist is needed, as in silo work, such a hoist may be had.

Koehring Dandie mixers are also made in the high drum paving type, illustrated and described on page 863.

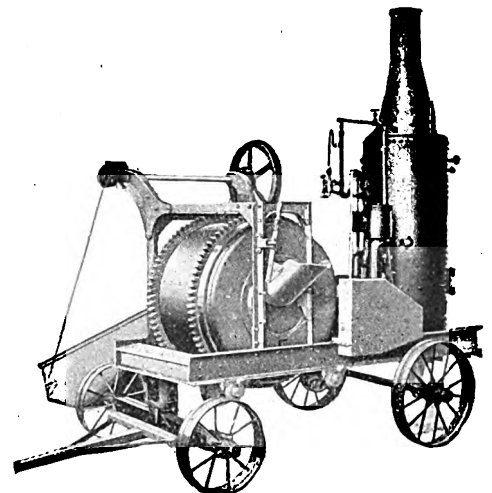
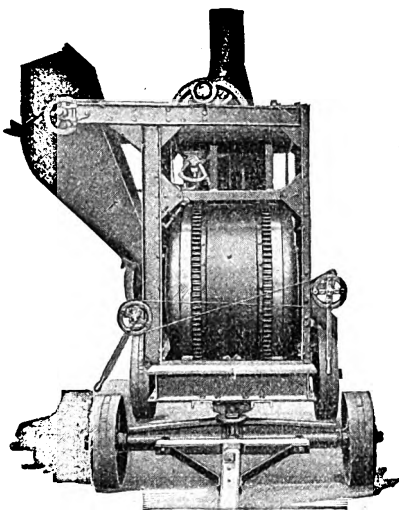


FIG. 3755

NO. 107S WITH CHARGING SKIP WITH STEAM ENGINE AND BOILER

KOEHRING HEAVY DUTY MIXERS



NO. 7-S—FIG. 3756

Fast charging—liberal drum dimensions, fast discharge, and trouble-proof heavy duty construction makes this the extra yardage mixer. Built to stand up under continuous full capacity operation. Cast drum heads of special wear resisting metal—with runways machined true, the double gear drum drive, with gear teeth "stepped" so that there is a steady application of power—the railroad truck principle of drum-roller construction, the mounting of drum rollers or underslung subframe, these are some of the features of heavy duty construction. The mounting of charging skip cable sheaves on out-reaching arms of the frame secures a more perpendicular pull, permitting the high angle charging skip which shoots material into the drum in one clean, swift slide. No pounding. Automatic clutch knockout stops the skip at high charging position, automatically applying brakes which hold the skip until released, allowing operator the freedom to finish discharge of preceding batch while charging skip is traveling to charging position, and to turn on water into drum before paying further attention to the charging skip.

THE MIXING ACTION

1—The first mixing action is caused by long diagonal throw-over blades set diagonally across the drum which cut through the material with a kneading action.

2—The second action occurs when the blades carry materials up with the motion of the drum and a portion of the materials tumble down against the motion of the drum.

3—The third action results when the diagonal blades reach a still higher point on the drum and the material is hurled downward across the circumference of the drum toward the discharge side.

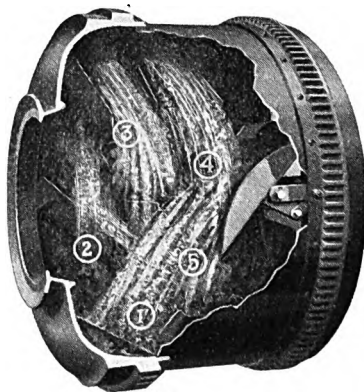
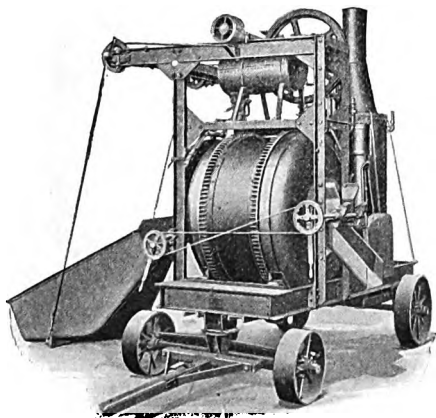


FIG. 5124

4—The mixing action so far brings the materials to the discharging side where they are taken up by pick-up buckets and carried to the top of the drum, at which point they are projected downward to the inverted discharge chute with a violent, break-up effect, which is the fourth mixing action.

5—As the reverse discharge chute receives the materials from the pick-up buckets and deflects them in a spraying shower back to the throw-over blades for repeated remixing trips through the entire mixing process

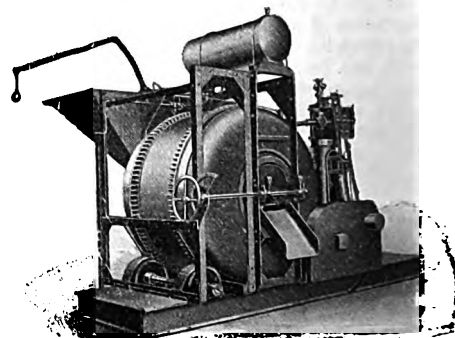


NO. 14-S—FIG. 3758

MADE IN 5 SIZES: 7, 10, 14, 21 AND 28 CUBIC FEET MIXED CONCRETE PER BATCH

Furnished without power or with gasoline power, steam power or electric motor.

Koehring heavy duty mixers mean not only extra yardage but lowest cost yardage, not only on a few jobs, but season after season.



NO. 28-S—FIG. 3757

KOEHRING DANDIE HIGH DRUM PAVING MIXER

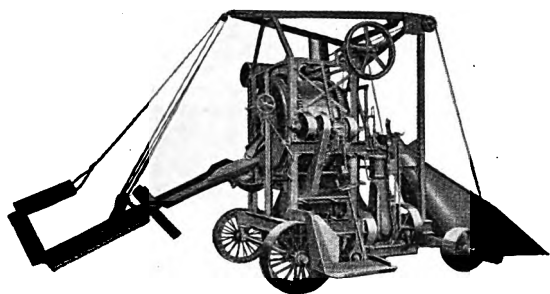


FIG. 5125

mixer which is absolutely indispensable to dependable service is the proper distribution of weight to eliminate the strains and heavy vibration likely to be present because of the elevation of the drum. This has been completely accomplished in the Koehring Dandie, by extra heavy frame construction, and by the low center of gravity. The power units and driving mechanism are mounted specially low. The boiler and engine are mounted on special frame underslung from the main frame. This low center of gravity not only makes hauling safe over uneven roads, but eliminates the wrenching strains and heavy vibration otherwise characteristic of high drum machines.

Furnished without power or with gasoline power, steam power or electric motor.

Capacity 14 cubic feet mixed concrete per batch.

The Dandie paver has the same all-steel construction and mechanical features as the Dandie side charging mixers described on page 861, including the railroad truck principle of drum roller construction—double gear drive—and large universal bearings throughout. Equipped with automatic water measuring tank and with forward and reverse traction. The height of the drum makes possible the long spout, at the steep angle to insure a fast distribution of concrete over an adequate area to make this mixer an efficient machine for alley, street and highway work. The angle of the spout on the Dandie paver has been carefully worked out to insure fast flow of concrete, without separation of aggregate. The spout is self-compensating. As the spout is shortened by raising an end section, the section next nearer the mixer which becomes the point of discharge automatically lowers, always maintaining the point of discharge at a uniform height which eliminates high drop of concrete. One of the most important features of the high drum paving

KOEHRING HEAVY DUTY PAVERS

Koehring pavers are extra yardage paving units because of the speed of the charging skip, liberal drum dimensions, fast discharge and the heavy duty construction which forestalls breakdowns and delays. The operations, both of charging and distributing, are in full view of the operator. This is a factor both of safety and fast operation. Extra automatic actions enable operator to maintain top-speed operation every minute of the day.

Made in four sizes: 10, 14, 21 and 28 cubic feet mixed concrete per batch.

Furnished without power or with gasoline power, steam power or electric motor.

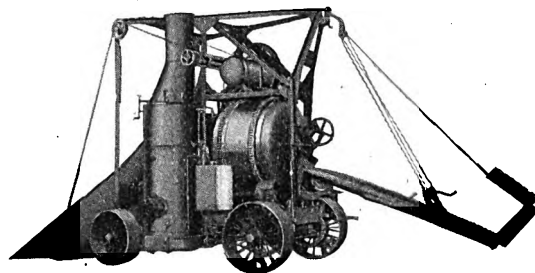


FIG. 5126

WITH BOOM AND BUCKET DISTRIBUTION

Boom and bucket distribution gives the greatest distributing range without moving the mixer—always a factor of greater day's yardage—and especially such a factor when mechanical mixer loading is employed, because the fewer the mixer moves, the easier to maintain proper relations between mixer and loader, or loading derrick and industrial cars or trucks.

The Koehring bucket automatically opens at whatever point it is stopped along the boom, partially spreading the concrete. It automatically closes when it returns to position for the next batch. This simple control releases the attention of the operator to control the other operations of the mixer and together with other automatic actions such as the self-stopping of charging skip in charging position, makes the Koehring paver the fastest paving unit.

Made in four sizes: 10, 14, 21 and 28 cubic feet mixed concrete per batch.

Furnished without power or with gasoline power, steam power or electric motor.

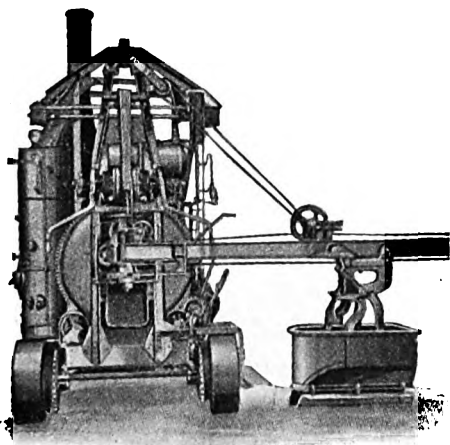


FIG. 5127

THE KOEHRING MIXER LOADER



FIG. 5128

The Koehring mixer loader is adapted for use either with the end charging paving mixers or with side charging mixers used in construction work. In paving work it precedes the mixer under its own power.

Bins adjustable to any proportion of mix, measure sand and stone. Conveyor belt delivers aggregate to loading skip, which is then operated in the usual way.

Capacity 100 cubic feet per minute with constant feed.

FRESNO SCRAPERS

2 Horse cut $3\frac{1}{2}$ Feet
3 " " 4 "
4 " " 5 "

We can also furnish Fresno Scrapers with special wear plates made especially to meet the requirements of Contractors, and Excavators having heavy work.

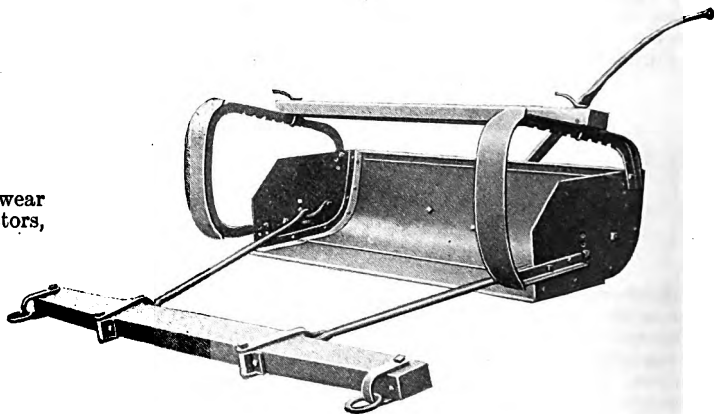


FIG. 3771



FIG. 3772

SOLID STEEL DRAG SCRAPERS

We can furnish Solid Steel Drag Scrapers in 3, 5 and 7 cubic foot capacities. The bowls of these scrapers are stamped from a single sheet of extra hard steel plate and are of seamless construction throughout.

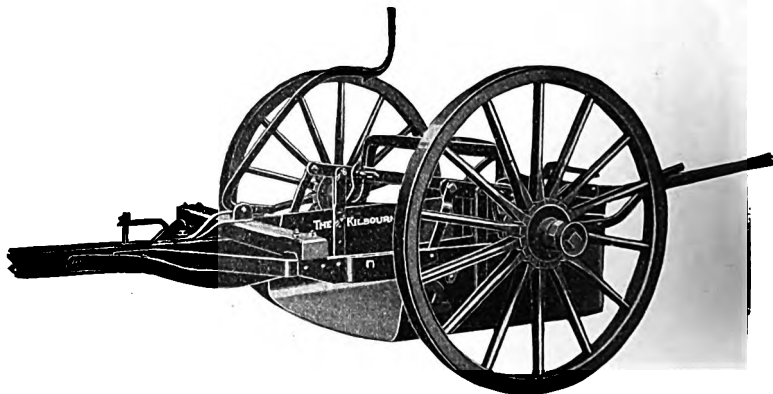


FIG. 3773

SQUARE BOWL WHEEL SCRAPERS

We can also furnish Square Bowl Wheel Scrapers with wood wheels in 9, 12, 14 and 16 cubic foot capacities.

KOEHRING TURBINE GRADER

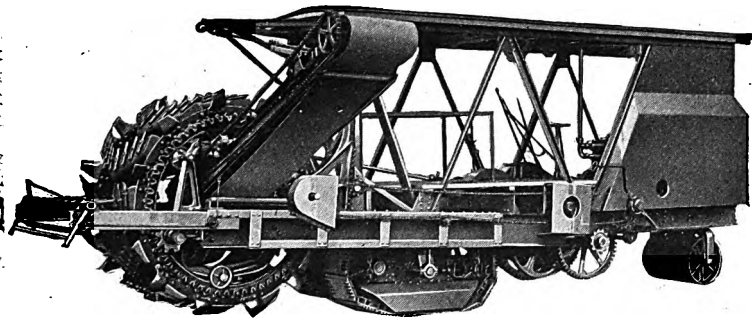


FIG. 3776

Digs and loads from 60 to 100 cubic yards per hour.

Cuts any depth from 1 to 24 inches.

Cutting width: 5 ft., 7½ inches.

Three digging speeds.

Traveling speed: 1 mile an hour.

Weight: 45,000 pounds with Gas Engine.

Built with the characteristic Koehring Heavy Duty construction. Turbine rack made of manganese steel segments, driving pinions of manganese steel. Gears and bearings all of special cast steel. Idlers are bronze bushed. All shafting extra heavy and all bearings have genuine babbit. If desired an automatic screen can be installed inside the cutting wheel for screening old macadam to save the stone.

KEYSTONE CABLE DRILLS

For Placer Gold Testing, in advance of dredge; Mineral Prospecting for Lead, Zinc, Coal, Copper, etc.; Oil, Gas and Water Well Drilling; Blast Holes in Cement and Stone Quarries. Equipped with Steam Engine, Gas or Electric Motors.

Made in various Styles and Depths—Capacities from 250 to 2500 feet.

The different classes of work are scientifically discussed in the following publications, which will be sent upon application:

Catalogue No. 1—Water Well Machines and Methods.

Catalogue No. 2—Mineral Prospecting Drills.

Catalogue No. 3—Portable Oil Drill Rigs.

Catalogue No. 4—Blast Hole Drills and Drilling.

In writing specify class of work you are interested in.

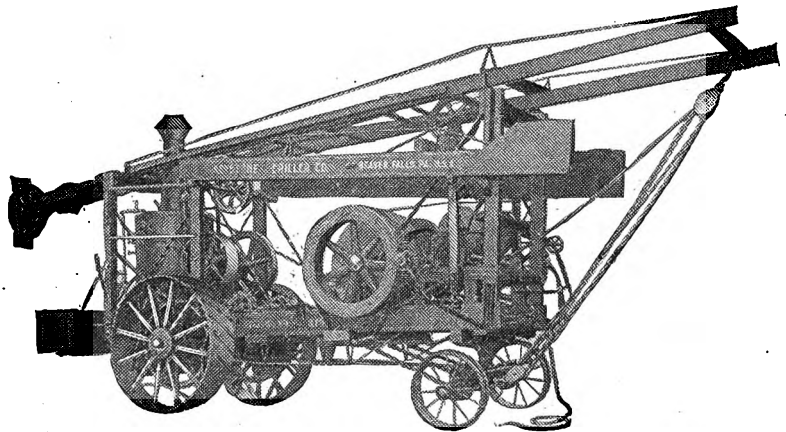


FIG. 3719

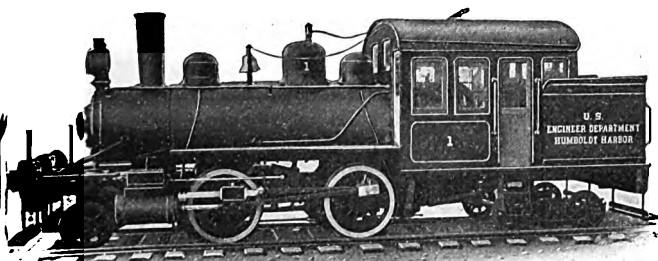


FIG. 3774

VULCAN LOCOMOTIVES

Built for service in every branch of industry; light and heavy contracting, logging, plantation and industrial work, and for freight and passenger service in railroading.

KEYSTONE TRACTION EXCAVATORS

The Keystone is a light general utility steam shovel for contractors' use. It can be equipped with four different, readily interchangeable buckets for various uses; skimmer, for road grading and general excavating; dipper, for side hill cutting; drag ditcher, for ditching, back filling and cellar digging; and clamshell, for unloading cars, deep ditching, etc. Made in three sizes, it has two traction speeds, $1\frac{1}{2}$ and 3 miles per hour and a long wheel base, about 10 feet, with large tread wheels and wide tires, which have removable cleats and cutter bands. Boom swings through a half circle. Operated by two or three men.

It is used widely for road grading, ditching, back filling, and cellar digging. Its very long horizontal crowd with the flat bottom skimmer—11 feet on model 3 and 14 feet on models 4 and 6, and its powerful crowding thrust, give it pre-eminence in road and street grading. It will economically handle a cut as shallow as four to six inches in depth, where the large, full-swing type of shovel could not be used to advantage, and it will take up old macadam, shale and materials of similar hardness without blasting or rooting. Since the Keystone shovel does not swing around in dumping, it can be operated close to buildings, telegraph poles, street car tracks, etc., without interference. It has exceptional lightness and portability. Traction of twenty-five miles have been made in two days. This adapts it for jobs that could otherwise be reached only by hand labor.

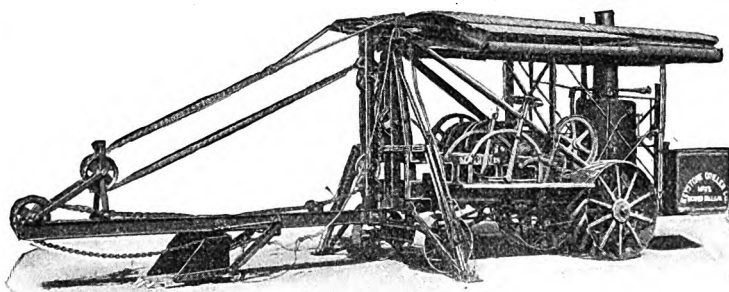


FIG. 5128

MODEL THREE—10 TON

Frame is made of structural steel riveted and rigidly braced. The sills are made of $4\frac{1}{2}$ x 9 inch Oregon fir. Has a single cylinder steam engine developing 18 H.P. Capacity 250 to 500 cubic yards per day of ten hours. Boom 16 feet long, giving horizontal crowding movement of 11 feet.

MODEL FOUR—12 TON

Built entirely of steel, and has a powerful two cylinder steam engine developing 32 H.P. Capacity 250 to 500 cubic yards per day of ten hours. It will load a $1\frac{1}{2}$ yard dump wagon in $1\frac{1}{2}$ to 2 minutes. Boom 18 feet long, giving a horizontal crowding movement of 14 feet.

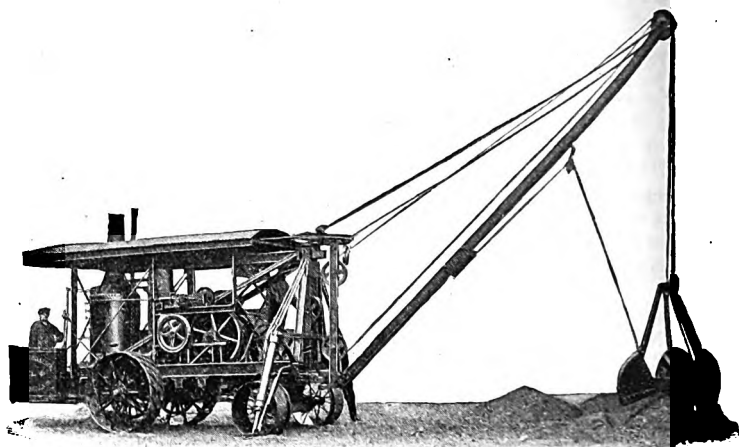


FIG. 5129

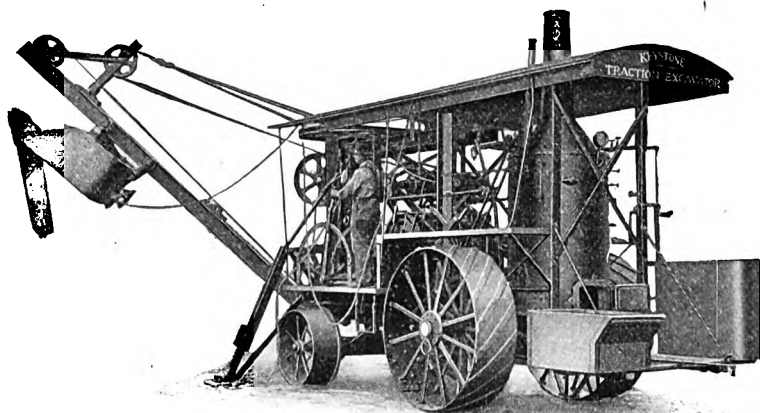


FIG. 5130

MODEL SIX—15 TON

Frame is made entirely of steel. Has powerful two cylinder steam engine developing 32 H.P. Capacity 250 to 500 cubic yards per day of ten hours. Boom 18 feet long, giving a horizontal crowding movement of 14 feet.

COCHISE STOPING DRILL

Compact in design. For durability it has no equal. The drilling speed is superior to any machine of its size and it is most economical in air consumption. The whole machine is made of steel and all parts liable to wear are hardened and ground.

COCHISE PISTON DRILLS

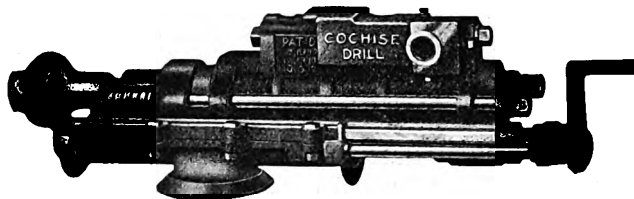


FIG. 3642

Cochise Piston Drills are particularly simple and sturdy. A Cochise not only gets the full kick out of the air used when the drill is new, but holds it right along.

Number	Sizes
7	2½ inches
9	2¾ inches
12	3½ inches

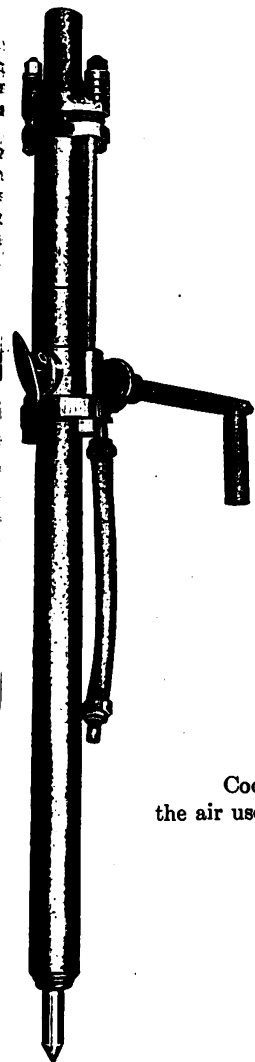


FIG. 3641

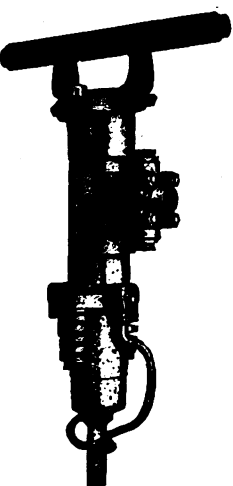
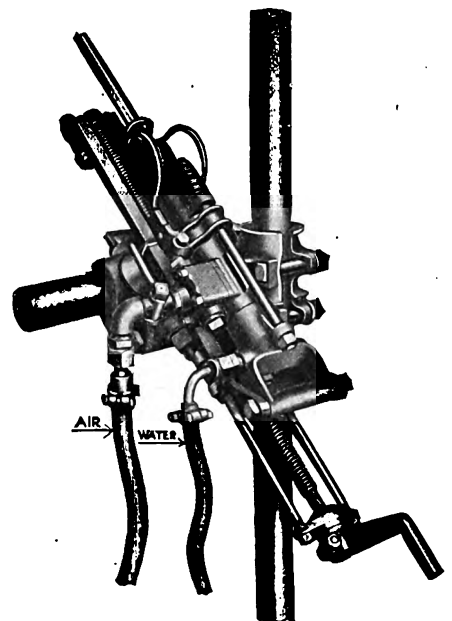


FIG. 3642

THE COCHISE ROCK HAMMER

The Rock Hammer weighs just 42 pounds. Used wet or dry for sinking, plugging, stoping, drifting, raising. Uses ¾ or 1 inch hollow hexagon steel. The Patented Cochise Spool Valve is incomparably simple, sturdy and effective. The Little Rock Hammer is furnished mounted for drifting and is hand-held for sinking.



COCHISE ROCK HAMMER DRILL MOUNTED
FOR DRIFTING WORK

FIG. 3643



FIG. 3637

THE SIMMONS IMPROVED DOUBLE JOINTED BALL-BEARING GIANT

"NO CENTER BOLT"

Made in sizes with 7-inch inlet and 6-inch outlet with 2-inch nozzle, to size with 18-inch inlet, 12-inch outlet and 8-inch nozzle. These Giants are also constructed of sheet steel throughout, with the exception of the joint and nozzle, which are of cast iron. They are less than one-half the weight of cast iron giants; they possess advantages that are at once apparent to the hydraulic miner.

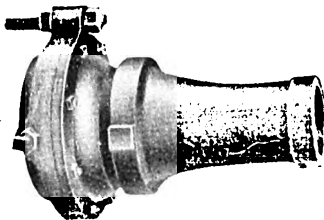


FIG. 3639

WATER GATES

These Water Gates can be furnished with either Wheel or Bars for operating in the following diameters: 7, 9, 11, 12, 13, 15, 16 and 18 inches.

THE CAMPBELL IMPROVED HYDRAULIC GRAVEL ELEVATOR

The Hydraulic Gravel Elevator has become a necessary adjunct to hydraulic mining and has long ago passed the experimental stage. Of the different patterns used, none have succeeded so well nor stood the test like the Campbell. If all elevating propositions the conditions govern as to size of elevator that should be used. It is therefore necessary that all requests for estimates should state:

1st—Diameter and length of supply pipe.

2nd—Volume of supply water available in miners' inches or cubic feet.

3rd—The pressure in pounds or head in feet, vertically, of supply water.

4th—The height in feet, vertically, to which it is desired to elevate the gravel.

5th—Amount of seepage water flowing into the pit.

6th—State if giants are to be used for washing down the gravel, and if the water for the giants is to be taken from the elevator supply pipe.

7th—If giants are used, state the size of nozzle and head under which they will be operated.

8th—State also, if possible, the character of deposit to be elevated.

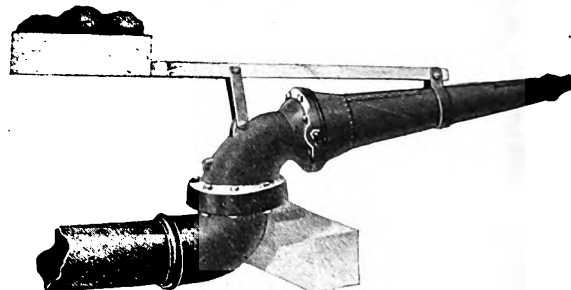


FIG. 3638

DEFLECTORS

These Deflectors can be furnished in sizes of 4, 5, 6, 8, 9 and 10 inches.



FIG. 3640

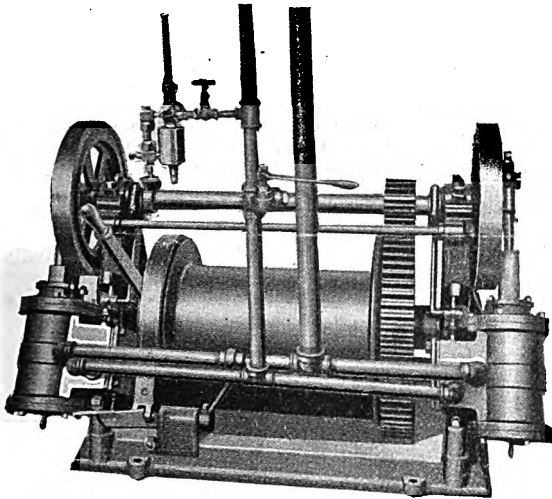


FIG. 3659

ANACONDA PROSPECTING HOIST

Will operate equally well with steam or compressed air. Approximate hoisting speed 125 feet per minute, hoisting capacity 1500 pounds, based on 80 pounds steam pressure at the throttle.

OTTUMWA 5X6 WINZE HOISTING ENGINE

WITH CUT GEARING

Especially adapted for Winze work and for handling timber. It is entirely self-contained, very compact and parts are easy of access. This hoist can be taken through an opening 42 x 48 inches and occupies a floor space of 36 x 42 inches. It can be run equally well with compressed air or steam and is entirely controlled with hand lever operating the friction clutch, and hand lever operating the band brake and the throttle lever. Load hoisted 1200 pounds.

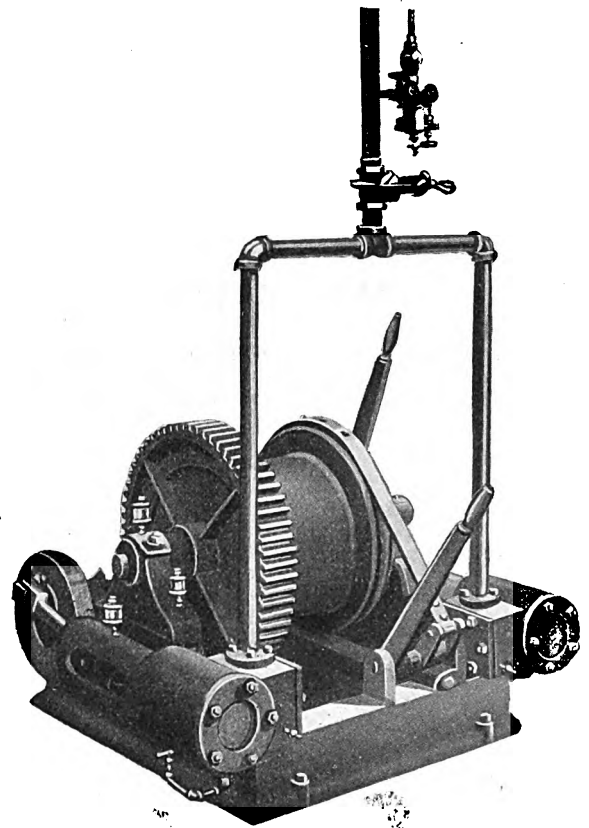


FIG. 3660

LICK DOUBLE CYLINDER REVERSIBLE LINK MOTION HOISTING ENGINE

Designed especially for mine service where a small sturdy equipment is desired for use with steam or compressed air. Drum Capacity—1500 feet— $\frac{1}{8}$ " cable. Weight hoisted on single rope, usual hoisting speed 1000 pounds.

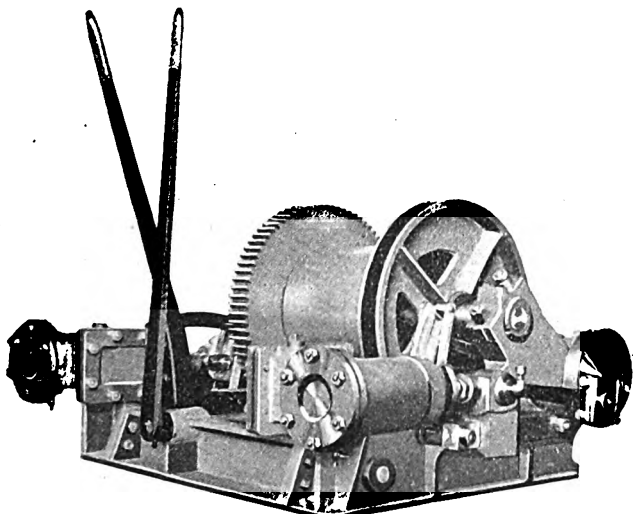


FIG. 3661

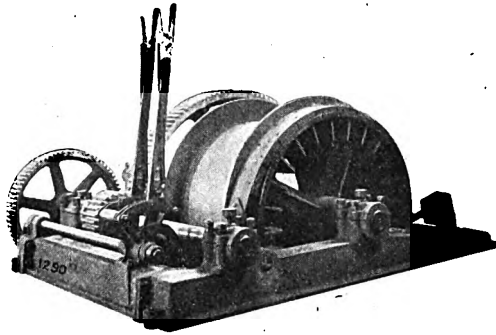


FIG. 3662

ELECTRIC HOISTS

SINGLE AND DOUBLE DRUM TYPE

Built sectional for mule back transportation and installation in underground workings. Capacities 2500, 3500 and 5000 pounds rope pull. Band Brakes and Clutches are standard. Post Brakes can be provided on the 5000 pound size.

Flat Friction Single Drum Hoists have capacities of 675, 825 and 1600 pounds rope pull.

Hoists larger than 5000 pounds rope pull are usually built to specifications drawn to suit the conditions of each particular case. The factory has drawings and patterns for hoists up to 50,000 pounds capacity, suitable for any service.

MINE CAGES

This cut shows the standard mine cage with safety dogs and hood. We are in position to furnish any size or type of cage that may be desired. When asking for information please give size of shaft, size of guides and load to be carried.

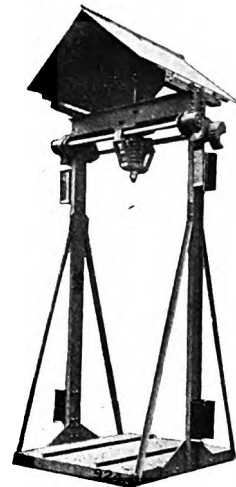


FIG. 3663

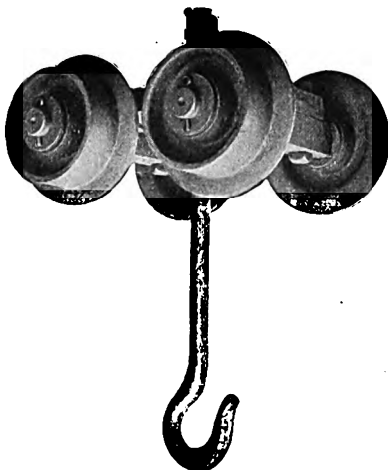


FIG. 3664

TROLLEY OR CRAWL

Crawl, or Trolley, for convenience in making repairs and adjustments to the stamp battery. The type shown in cut should, of course, be equipped with a chain block. Also used to advantage over crushers, stampers, grinders, etc. and for moving heavy parts about the mill.

ORE BUCKETS



FIG. 3793

KIBBLE

SUITABLE FOR VERTICAL SHAFTS

Made of plate steel pressed to shape by hydraulic process. The rivets are counter-sunk. The sides are smooth and of such shape that they cannot catch upon the timbers or sides of shafts. The bottom is dish shaped and the dumping ring so fitted that it does not prevent the bucket, when landed, from standing upright.

Furnished in three sizes.

Diameters.....inches	20	21	24
Depths.....inches	24	30	32
Capacities.....pounds	550	750	1100

STANDARD

SUITABLE FOR VERTICAL OR INCLINE SHAFTS. BENT IN AT TOP AND BOTTOM, WITH RING IN BOTTOM.

Furnished in nine sizes.

Diameters.....inches	18	20	22	24	26	28	30	32	36
Depths.....inches	24	26	28	30	32	34	36	37	40
Capacities.....pounds	350	470	620	780	980	1200	1450	1700	2300



FIG. 3794



FIG. 3795

WINDLASS

MADE OF STEEL, NO. 14 BODY, NO. 12 BOTTOM

Furnished in two sizes.

Diameter at Top.....inches	16	19
Diameter at Bottom.....inches	14	14
Depth.....inches	16	15
Capacities.....pounds	175	200

BUCKET CARS

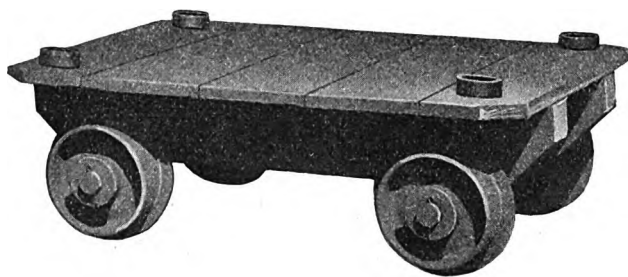


FIG. 3653
WITH WOODEN FRAME

Made in three sizes with 6, 8, and 10 inch wheels for buckets 24, 28 and 32 inches in diameter.

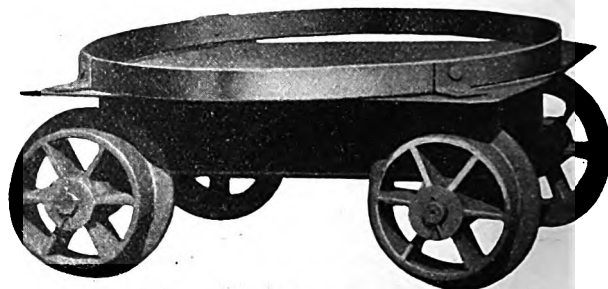


FIG. 3654
WITH STEEL FRAME

SELF DUMPING VERTICAL SKIP

WITH AUTOMATIC DUMPING DEVICE AND SAFETY CATCH

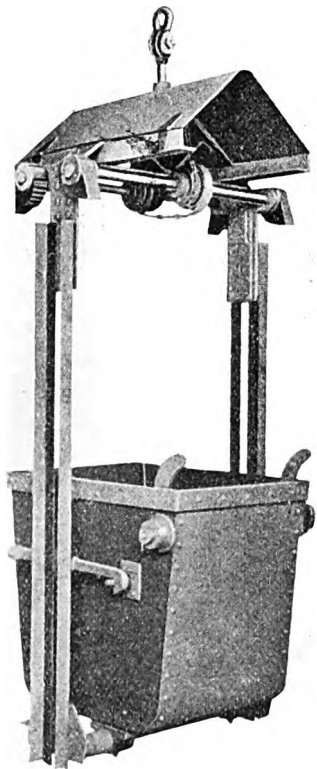


FIG. 3655

Made in six sizes; capacities: 10, 15, 20, 30, 40 and 50 cubic feet.

SELF DUMPING INCLINE SKIP

Made of Steel thoroughly riveted, cast iron wheels with steel axles. The rear wheels are double the width of front wheels for dumping skip. These skips can be used for either ore or water. Those intended for bailing water have automatic valve in the back end and are more closely riveted.

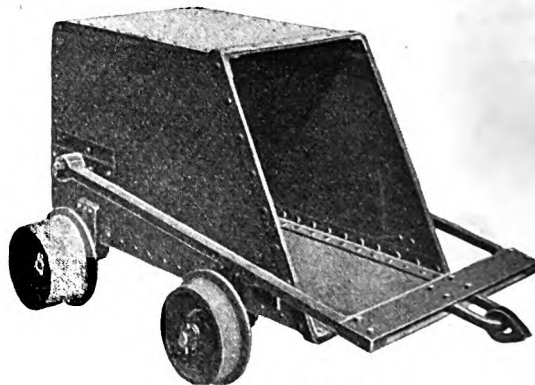


FIG. 3656

Made in five sizes; capacities 7, 10, 13, 19 and 28 cubic feet.

STANDARD SELF-DUMPING AND SELF-RIGHTING CONTRACTORS' BUCKETS

FOR CONCRETE, STONE, SAND, MORTAR, ETC.



FIG. 3740



FIG. 3741



FIG. 3742

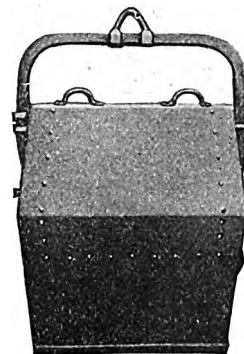


FIG. 3743

Capacities 3 to 42 cubic feet.

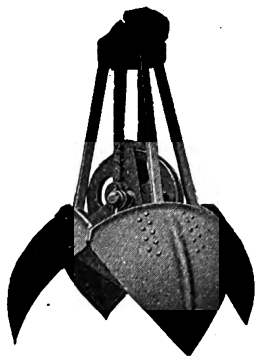


FIG. 3744

ORANGE-PEEL BUCKETS

Will handle all kinds and sizes of coal, dirt, gravel, mud, clay, grain, sawdust, broken stone, etc. The bucket is operated by two ropes running to two friction drums, one line being used to hoist and close the bucket, the other to open and lower it. Its weight and movements make it self-penetrating into all ordinary materials. It is especially useful for dredge work.

CLAM-SHELL BUCKETS

The shape of this bucket makes it specially adapted to unloading cars, barges, etc., where digging qualities are not essential, and the nature of the material will permit its use.



FIG. 3745

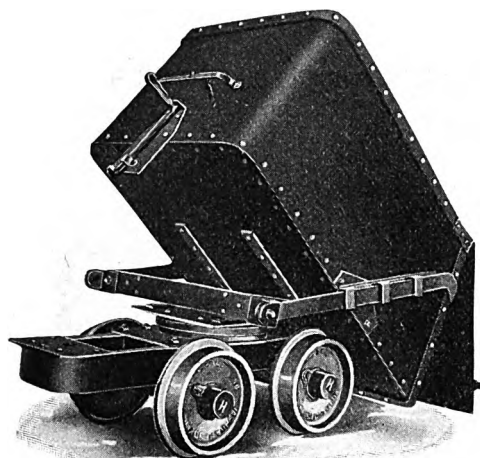


FIG. 3650

MATTESON MINE CARS

Contents may be dumped on end or either side.

This type of car can be furnished in seven sizes: from 10 to 27 cubic foot capacity.

Standard Gauge, 18 inches is always furnished unless otherwise specified—other sizes and gauges built to order.

MATTESON V-SHAPE BODY CAR

AN EITHER-WAY OR DOUBLE SIDE DUMP CAR

V Shaped Body Cars can be furnished in sizes from 13½ cubic feet to 108 cubic feet.

Equipped with drawheads or coupling links. If brakes are required they may be readily fitted.

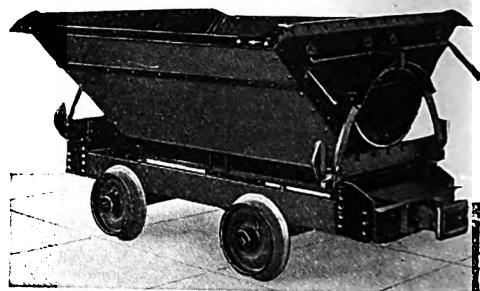


FIG. 3651

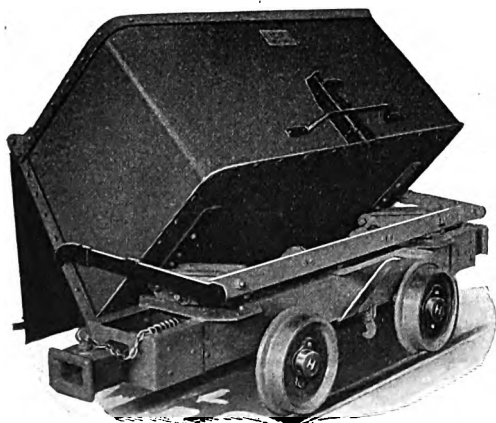


FIG. 3652

MATTESON GABLE BOTTOM DOUBLE SIDE DUMP CARS

Can be furnished in sizes from 22 cubic feet to 67½ cubic feet. Equipped with Drawhead, Link, Chain or Bar Couplings. Brakes are seldom required.

BURY AIR AND GAS COMPRESSORS

ALL SIZES—FOR ALL USES—AND TO MEET ANY ENGINEERING REQUIREMENT

Plate Type also Patented Cushion Poppet Intake and Discharge Valves. Noiseless in operation. Large machines have Patented Box Pyramid Valves. These have greater area than any other valve. The Patented Three Cylinder Variable Volume Compressor with quarter unloading by one pound variation or to suit conditions is an exclusive Bury Type. Ratios of compressors same at all loads. No undue heating of air. Efficiency same at all loads. High mechanical efficiency; largest and greatest net air actually delivered; saving by maintaining lowest peak to meet operating conditions.

All Bury Compressors are strongly built with the weight properly distributed; are compact in design and low in operating and maintenance charges. Designed particularly to lessen the work of the compressor operator—simple, convenient, accessible.

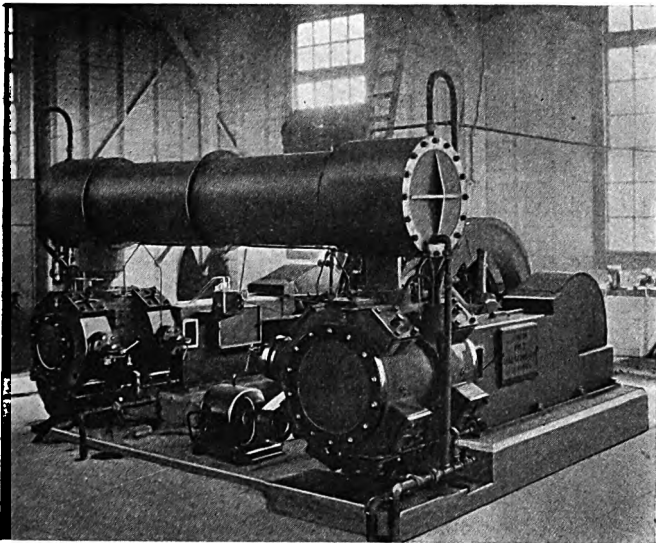


FIG. 3644

CLASS "BPPE"

HEAVY DUTY ENCLOSED FRAME DUPLEX TWO STAGE AIR COMPRESSOR

Arranged with direct connected self-starting synchronous motor, mounted on compressor shaft.

Capacity 1580 cubic feet per minute. 100 Pounds discharge pressure.

Motor 300 Horsepower operating on three phase, sixty cycle, four hundred forty volt electric current.

Two compressors of this size are installed at the plant of the Pacific Coast Shipbuilding Company at Bay Point California, supplying compressed air for pneumatic riveting, chipping and scaling hammers, drills, hoists, paint spraying, etc.

CLASS "BPP"

HEAVY DUTY ENCLOSED FRAME DUPLEX TWO STAGE AIR COMPRESSOR

Arranged with close belt drive from induction motor.

Capacity 800 cubic feet per minute. 100 Pounds discharge pressure.

Motor 150 Horsepower, operating on three phase, sixty cycle, four hundred forty volt electric current.

Installation at Boiler Shop of Main Street Iron Works, San Francisco California for supplying compressed air to operate pneumatic drills, hoists, chipping and riveting hammers, etc

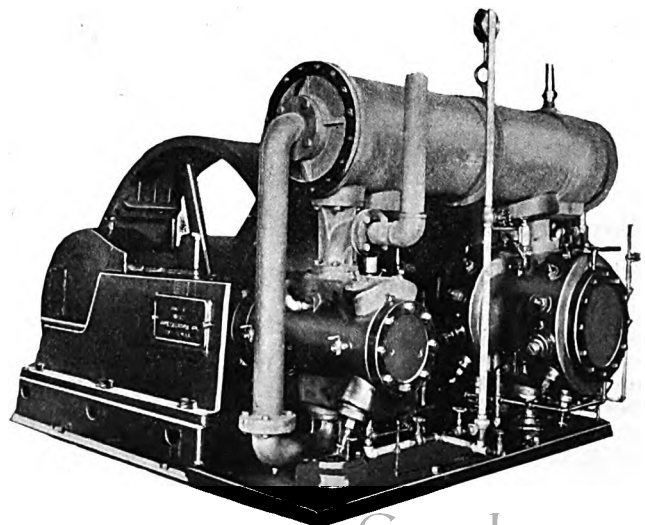


FIG. 3645

BURY AIR AND GAS COMPRESSORS

ALL SIZES—FOR ALL USES—AND TO MEET ANY ENGINEERING REQUIREMENT

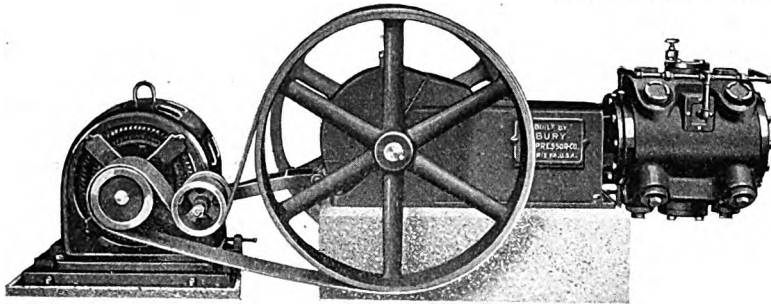


FIG. 3646

CLASS "H L"

SINGLE STAGE BELT DRIVEN AIR COMPRESSOR

Can be supplied with or without idler pulley and short belt drive as shown.

Built with enclosed frame, splash lubrication and plate valves in capacities 45 to 468 cubic feet, free air piston displacement per minute, 25 to 100 lbs. pressure.

CLASS "L S"

SINGLE STAGE STRAIGHT LINE STEAM DRIVEN AIR COMPRESSOR

Built with enclosed frame, splash lubrication and plate valves in capacities of 45 to 448 cubic feet, piston displacement per minute 25 to 100 lbs. pressure. May be also arranged for Vacuum pump service.

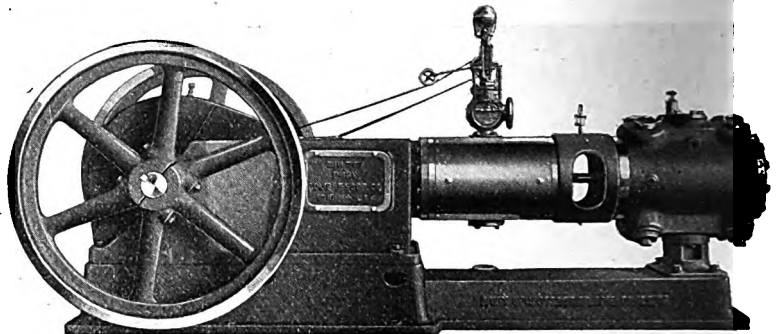


FIG. 3647

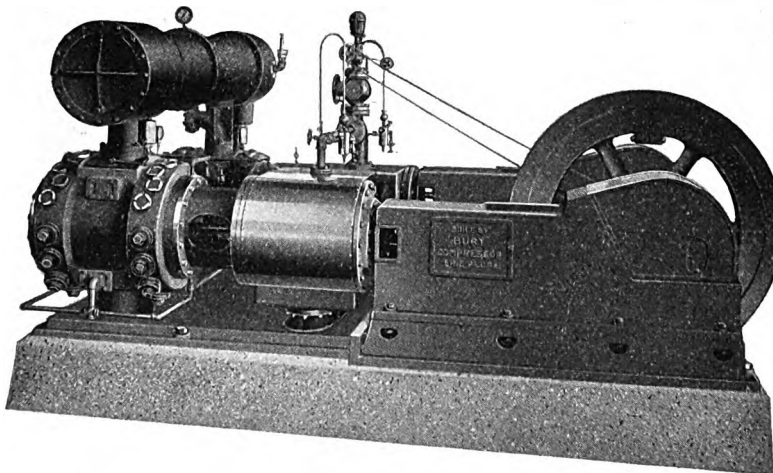


FIG. 3548

CLASS "C P P"

DUPLEX TWO STAGE VARIABLE VOLUME STEAM DRIVEN AIR COMPRESSOR ARRANGED WITH AUTOMATIC REGULATION

Capacities 245. to 1600 cubic feet, piston displacement per minute for prompt delivery. Larger sizes built to order.

CLASS "V C C E"

THREE CYLINDER VARIABLE VOLUME AIR COMPRESSOR WITH SELF-STARTING SYNCHRONOUS MOTOR MOUNTED ON COMPRESSOR SHAFT

This compressor also supplied belt driven and designated as Class "V C C B."

Classes "V C C E" and "V C C B" equipped with Bury Variable Volume Unloading System arranged to unload by no load, quarter load, half load and full load using power practically in direct proportion to the air delivered.

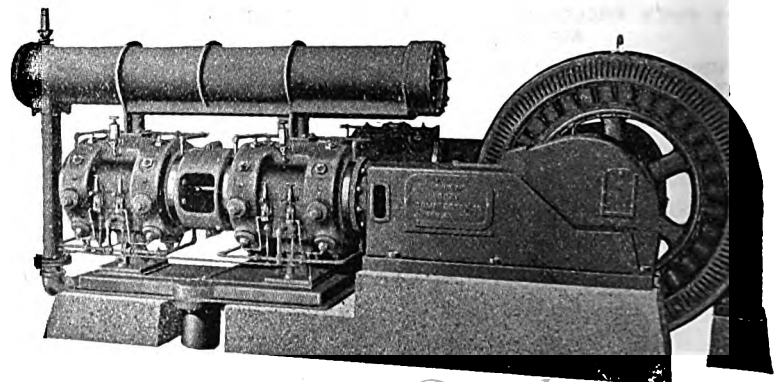


FIG. 3649

BURY AIR AND GAS COMPRESSORS

ALL SIZES—FOR ALL USES—AND TO MEET ANY ENGINEERING REQUIREMENT

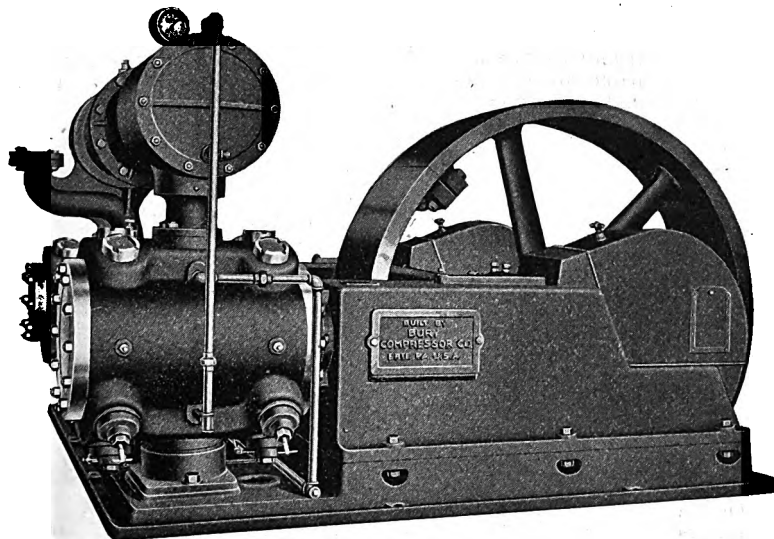


FIG. 3650½

CLASS "B P P"

DUPLEX TWO STAGE VARIABLE VOLUME BELT DRIVEN AIR COMPRESSOR, ARRANGED WITH UNLOADING SYSTEM

Capacities 245 to 1600 cubic feet piston displacement per minute for prompt delivery. Larger sizes built to order.

C. H. & E. POWER DRIVEN AIR COMPRESSOR

The C. H. & E. Power Driven Air Compressor mounted on a Channel Iron Truck is a complete Pneumatic plant for use in operating Chipping and Caulking Hammers and Pneumatic Boring Machines. It can also be used in connection with a Pneumatic Grinder for surfacing concrete walls, columns, floors, etc.

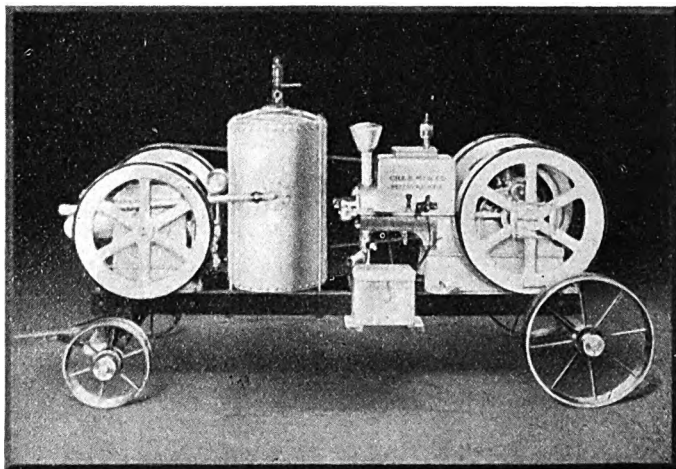


FIG. 5131

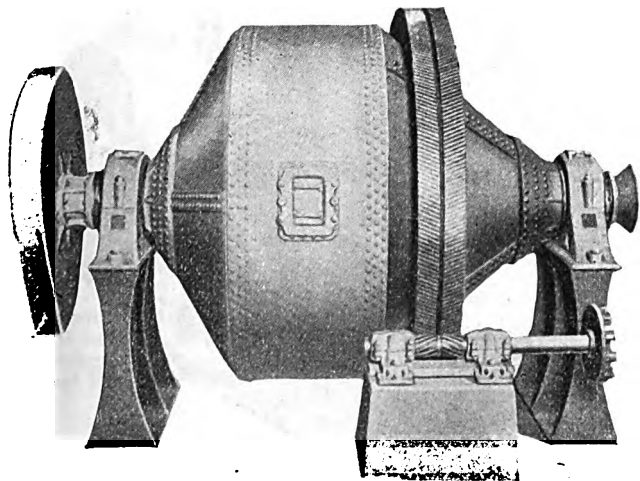


FIG. 3652½

HARDINGE CONICAL BALL AND PEBBLE MILL

MADE IN SIZES: 3 TO 8 FEET DIAMETERS

As with the Cylindrical Type, the Hardinge Conical Mill is used as a Ball Mill for coarse material of one inch to three inch diameter reducing this to suitable size for feeding the Pebble Mill. The Pebble Mill will take material as coarse as one half inch diameter reducing this to any desired fineness. Grinding may be done either wet or dry, depending upon conditions to be met.

Selection of the size and type of mill best suited can only be made upon receipt of detailed information covering capacity per hour, character of material to be ground, size of feed and discharge, wet or dry grinding, etc.

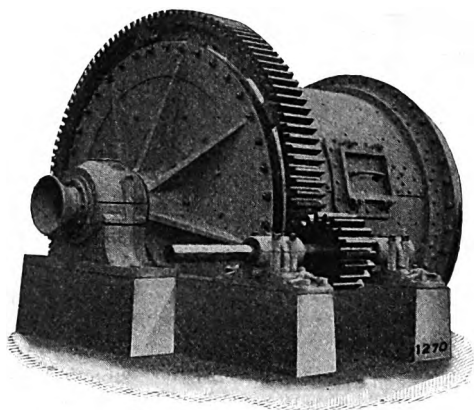


FIG. 3665

NEW IMPROVED HUNTINGTON MILL

TWO SIZES: 5 FT., AND 6 FT. DIAMETERS

Has many advantages over the Geared Mills. Is arranged to be set directly on a concrete foundation or on sills. Driven by a pulley mounted directly on the disk driver and all gears are dispensed with while the roller hangers are fitted with graphite bushings and are carried on ball bearings. The Mill is heavier in its parts and of much better proportion throughout.

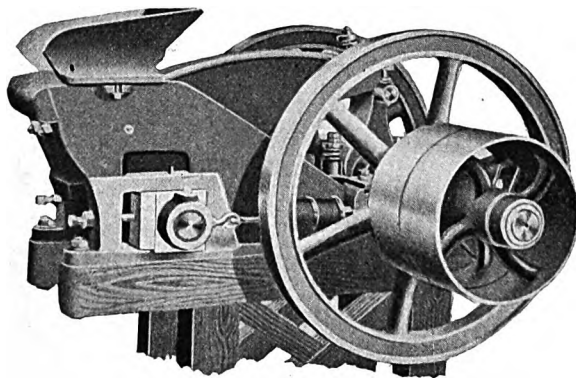


FIG. 3667

IMPROVED GIANT ROCK BREAKER

BLAKE PATTERN (PATENTED)

MADE IN TWO SIZES: 8 X 10 AND 9 X 15
CAPACITIES FROM 4 TO 12 TONS PER HOUR

This cut shows the Breaker made in sections, in a manner which insures greater strength than the old form of construction, while at the same time the weight of the machine is much less. Our experience shows that since adopting this style of construction, the chances of breaking the machine in working hard rock are reduced to the minimum. Both sizes kept in stock and ready for immediate shipment. The 8 x 10 can be made in sections for packing on mules, at extra cost.

BALL MILLS

Will crush wet or dry; take feed direct from crusher and reduce to 20 mesh; take feed direct from rolls or stamps and reduce to 200 mesh. 5-ton capacity to 500-ton capacity in one unit. Many other advantages.

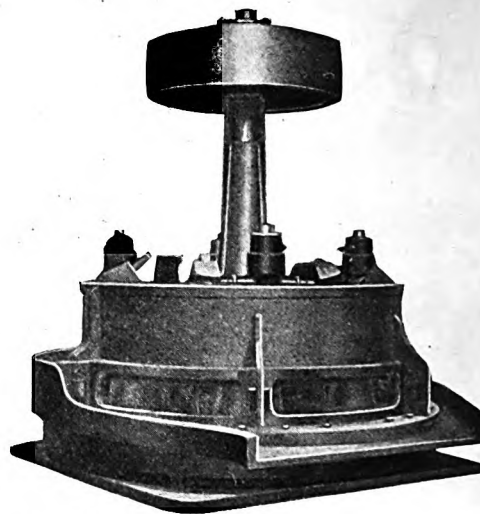


FIG. 3666

DODGE IMPROVED ROCK BREAKER

MADE IN FOUR SIZES: NOS. 0, 1, 2 AND 3
CAPACITIES FROM 1 TO 8 TONS PER HOUR

This breaker should be ordered when fine crushing is desired. Our system of construction provides, in this breaker, for ready, positive adjustment for finer or coarser particles as desired. We make the No. 2 Breaker in sections, at extra cost, so that it can be carried on mules; No. 3 can be packed on mules without cutting.

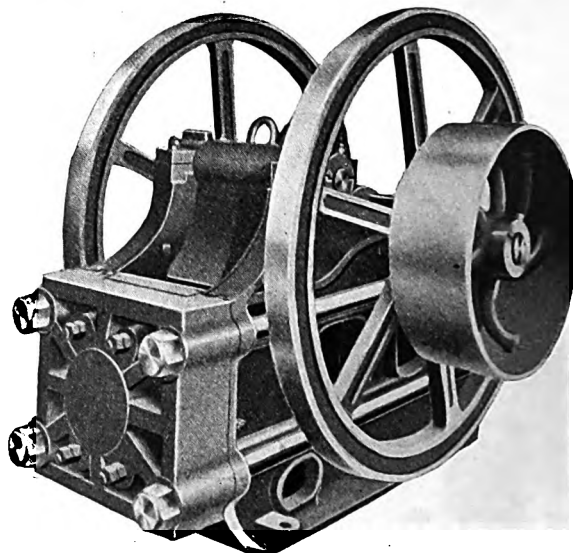


FIG. 3668

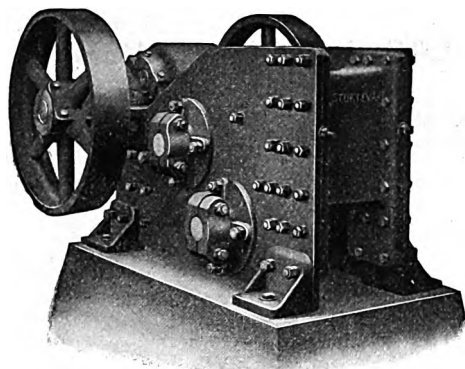


FIG. 3674

JAW CRUSHERS

Sizes: From 2 x 6 inches to 12 x 26 inches.

For coarse, intermediate and fine crushing, plate steel, cast steel and cast iron construction. Blake, Dodge and roll jaw actions. Cam and roll designs.

BALANCED CRUSHING ROLLS

MADE IN SIZES FROM 8 X 5 TO 38 X 16 INCHES

For coarse or fine work, wet or dry, with hard or soft rock and ore.

Balanced construction. Springs back of all four bearings give instant relief under breaking pressures. Shocks quartered. Automatic adjustments.

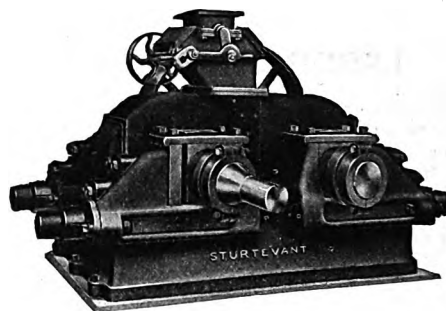


FIG. 3675

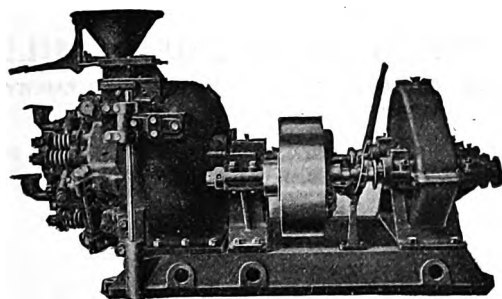
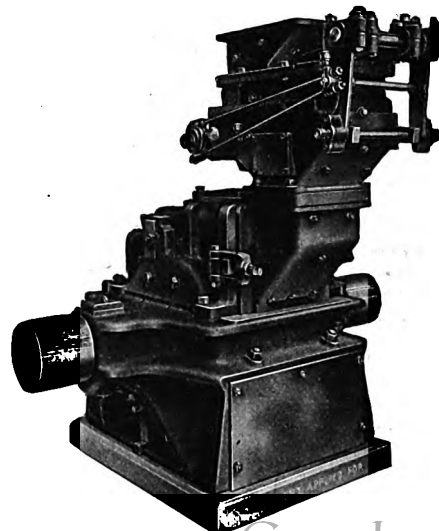


FIG. 3676

"OPEN DOOR" RING ROLL MILLS

MADE IN FIVE SIZES

For grinding hard, medium or soft materials from 2 inches to from 10 to 100 mesh. For grinding cement-clinker, limestone, ores, granite, trap, phosphate, clay, shale, iron-borings, feldspar, etc. Slow-speed, durable and accessible. No internal screens. Large capacity per horse-power and low upkeep. Capacities from 1 to 25 tons per hour.



HINGED HAMMER PULVERIZER

RANGE OF OUTPUT—1-INCH TO 20 MESH AND FINER

For pulverizing soft and moderately hard materials such as Limestone, Lime, Shells, Chemicals, Talc, Clay, Chalk, Bark, Rosin, Sulphur, Salt, Coal, etc., etc.

Swing sledge, hammer-bar and hinged hammer pulverizers are all machines of the same class, and are high speed pulverizers. Crushing is done by a series of blows delivered at high speed against the material fed into the machine.

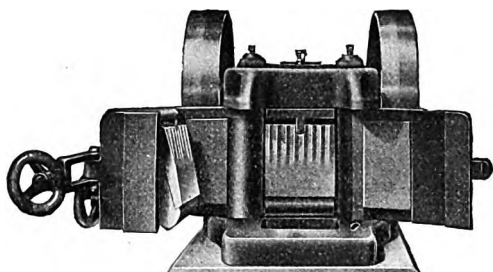


FIG. 3678

LABORATORY CRUSHER

"OPEN DOOR"

For crushing any rock or ore from 1 to 3-inch size to cracked corn size and finer. Easy to clean, requires from 1 to 2 H.P. Capacities from 100 to 600 pounds per hour. Two sizes, jaw openings, 2 x 4 inches and 2 x 6 inches. Also larger sizes, 4 x 8 inches, and 5 x 10 inches.

LABORATORY ROLL

Crushes hard or soft rocks and ores from $\frac{1}{2}$ -inch to 8 mesh or even as fine as 40 mesh. Usually installed to reduce crusher outputs finer. Two sizes, 8 x 5 inches, and 12 x 12 inches. Capacities from 200 pounds to 1 ton per hour. Immediately accessible for cleaning automatic adjustments.

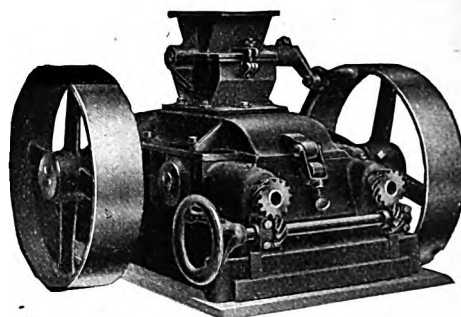


FIG. 3679

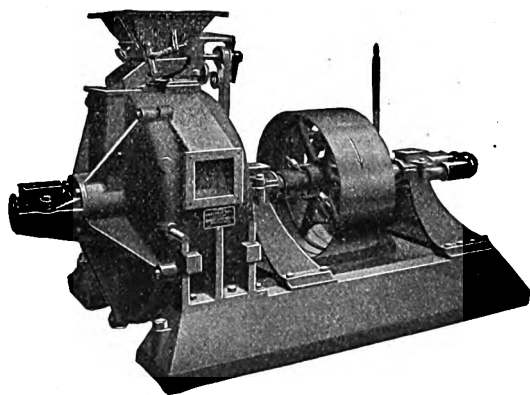


FIG. 3680

VERTICAL ROCK EMERY MILLS

VERTICAL MILLSTONES MADE OF ROCK EMERY

RANGE OF OUTPUT — 30 TO 200 MESH

For grinding soft and moderately hard materials such as Talc, Soapstone, Lime, Gypsum Clay, Facings, Colors, etc., etc.

HORIZONTAL ROCK EMERY MILLS

HORIZONTAL MILLSTONES MADE OF ROCK EMERY

RANGE OF OUTPUT — 30 TO 200 MESH

For grinding moderately hard materials.

This mill will grind harder substances more economically than the Vertical Mills, as the grinding surfaces are larger and run at slower speeds. Well adapted for limestone, shale, graphite coal, mineral colors, etc.



PATENTED

FIG. 3681

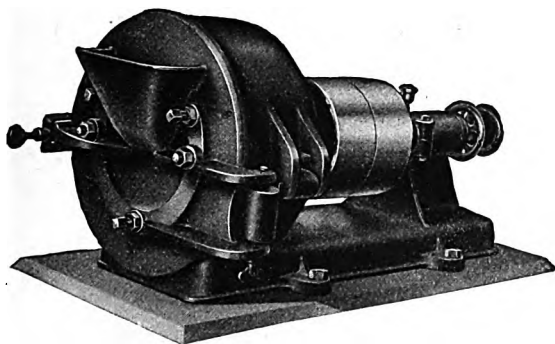


FIG. 3682

SAMPLE GRINDER

For the finer grinding of rock and ore samples. Pulverizes to 80 or 100 mesh or coarser. Open door construction for accessibility and thorough cleaning. Capacity from 50 to 200 pounds per hour. Power, 3 H.P.

DRY MIXERS

BATCH TYPE

Batch every two to three minutes.

Within one-tenth to one one-hundredth of one per cent of theoretically correct analysis without adding excess values.

For mixing fertilizer or other dry ingredients in batches from $\frac{1}{2}$ to 1 ton. Capacity is from 10 to 30 tons per hour.

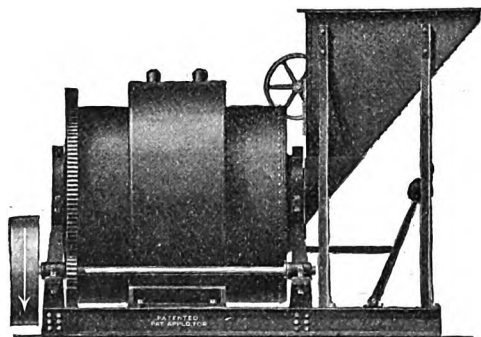


FIG. 3684

HAMILL ORE FEEDERS

BELT DRIVEN TYPE

The Belt Driven Hamill Ore Feeder is highly recommended for feeding Ore Pulverizers and Mills. This Feeder is also made to operate from a Stamp Mill. The ore spreads evenly over the entire width of the belt and distributes the ore better than any other Feeder made and thereby greatly increases the capacity of the Pulverizer.

STAMP ACTUATED TYPE

Adjustable while running, the Hamill can be set to longer or shorter stroke, or to nothing, independently of the speed of the driving pulley or rock-shaft. Self-Contained. The Hamill is a unit, light, handy, easily attached to the bin or hung under the stamp platform.

Requires little height, little space and weighs less than half the weight of other feeders.

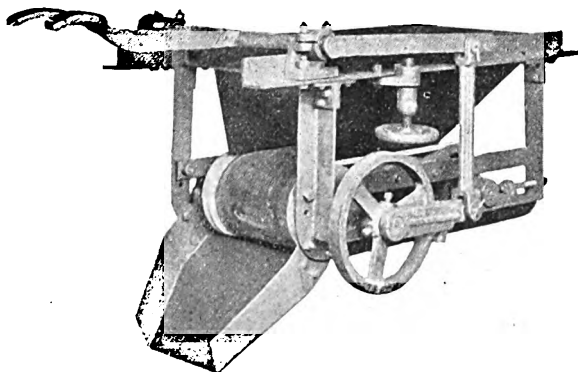


FIG. 3685
BELT DRIVEN TYPE

NEWAYGO SEPARATORS

INCLINED VIBRATING SCREEN

Screens everything screenable that is reasonably dry.

Built in several models. Special Types for special work.

Range of output— $\frac{1}{4}$ inch to 180 mesh.

From 1 to 4 products with one Separator.

A coarse mesh to secure an accurate, fine product, thus reducing wear to a minimum. Vibrating mechanism—light hammer taps on re-enforced screen surface, held automatically taut.

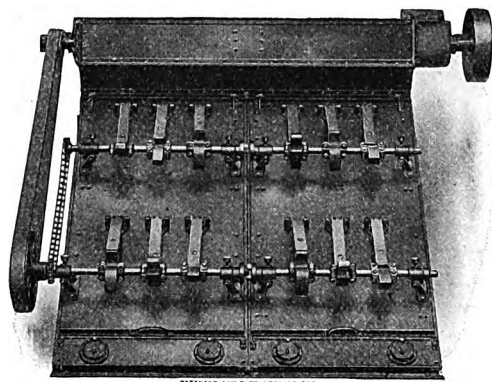


FIG. 3687
TWO-UNIT BATTERY—SUPER SCREEN

REVOLVING GRIZZLY

The Revolving Grizzly is preferable to the ordinary flat type of grizzly in mills of large capacity on account of its more thorough screening and saving in labor of rehandling the ore. It is also an automatic feeder for the crushers.

The Standard Revolving Grizzly has a screening surface 4 ft. diameter by 11 ft. long and a capacity of about 300 tons of ore in 24 hours.

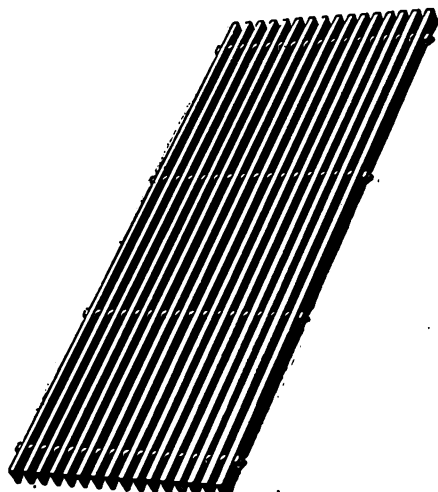


FIG. 3689

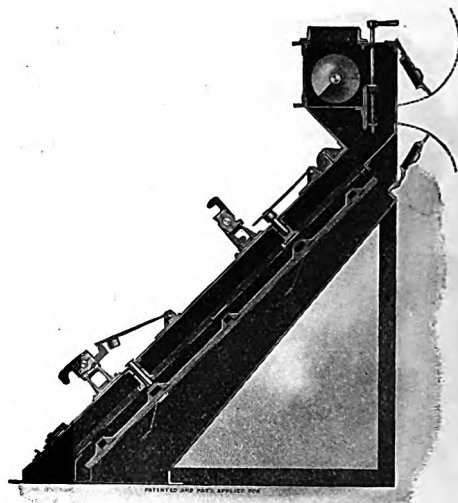


FIG. 3686
INTERIOR VIEW—SUPER SCREEN
SHOWING ACTION

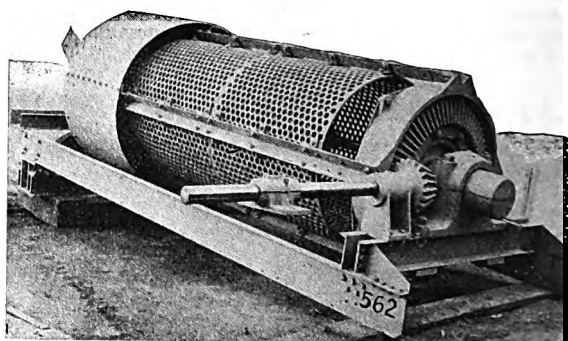


FIG. 3688

STATIONARY GRIZZLY

Furnished in standard sizes from $3\frac{1}{2}$ ft. by 8 ft. with 1 inch openings to 5 ft. by 10 ft. with $2\frac{1}{4}$ inch openings, but any size or mesh can be furnished.

STANDARD RACK AND PINION ORE BIN GATES

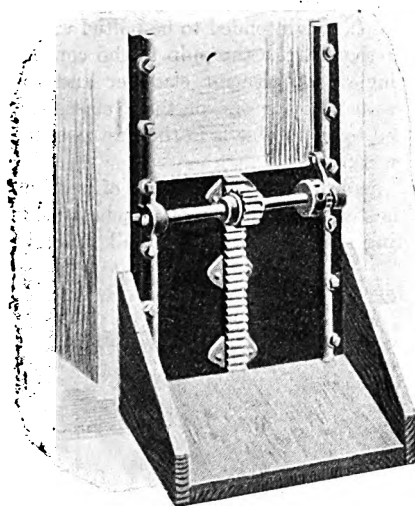


FIG. 3690

Made in three styles, viz: Single Rack and Pinion operated by hand wheel, or by a bar, and by two racks and pinions, operated by bar or hand wheel as preferred.

18 inches wide x 24 inches high, one rack and pinion.

24 inches wide x 30 inches high, one rack and pinion.

24 inches wide x 30 inches high, two racks and pinions.

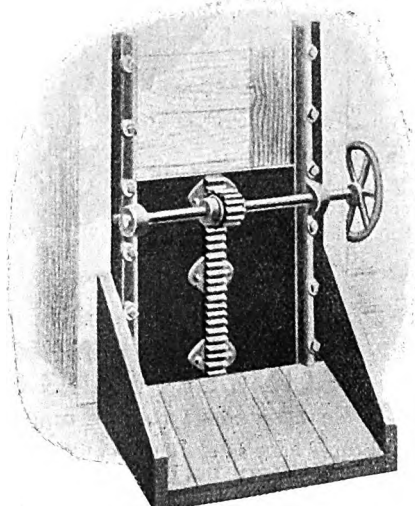


FIG. 3691

SEGMENTAL ORE BIN GATES

A popular gate, opened and closed quickly, and by many has preference over other types. Made in one size only.

Vertical opening.....24 inches

Horizontal opening.....24 inches

Center shaft to base of opening.....15 inches

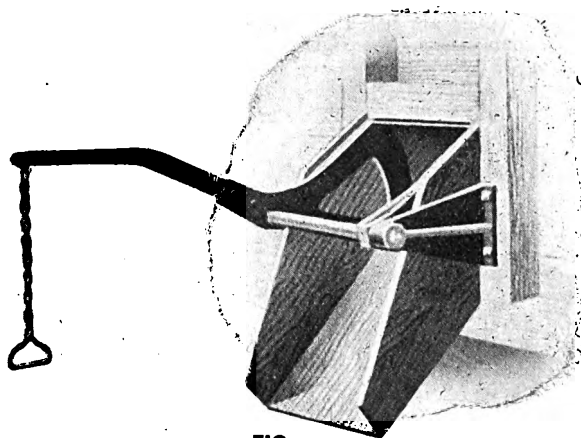


FIG. 3692

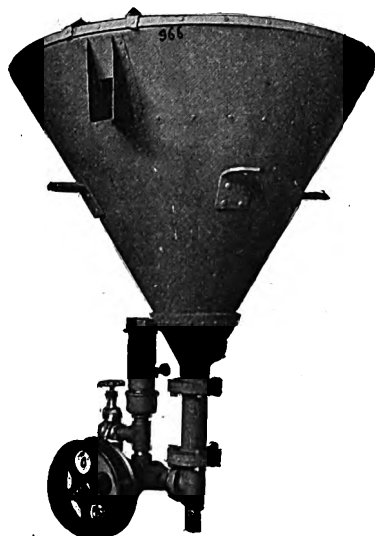


FIG. 369

RICHARDS PULSATOR CLASSIFIER

TYPE C

Made in the same sizes as the Dewco Pulp Thickening Cones (on next page) but on account of the addition of the Richards Pulsator Valve the capacity is greater and the classification is more thorough.

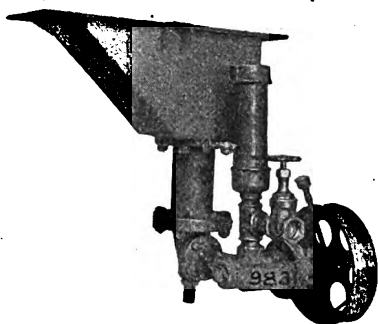


FIG. 3693

PULP THICKENING AND SLIME SETTLING CONES

SIZES FROM 3 TO 8 FT. DIAMETERS

All cones have sub-level feed pipes with angle iron supports therefor and internal rim overflow launders, which are riveted to cone thus stiffening the cone. Plug discharge cones have bottom castings bored out for wooden plugs. Syphon discharge cones have bottom castings with two-way discharge, one discharge being normally plugged up and affording a means for emptying the cone if syphon becomes plugged up. Syphon discharge cones are fitted with valves and syphon pipe with flexible connections. See page 883 for cones fitted with Richards Pulsator Valve.

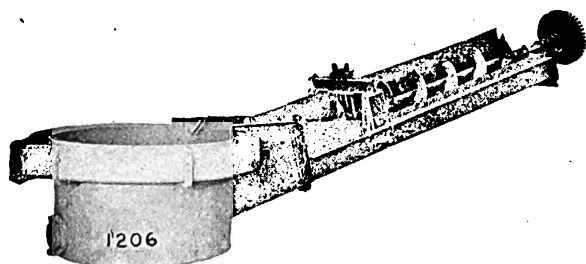


FIG. 3697

RICHARDS PULSATOR JIG

A two-jig unit consisting of two 12-inch single compartment Richards Pulsator Jigs coupled together in series with dewatering box between. Made in several sizes, giving capacities of from 20 to 500 tons per hour.

RICHARDS PULSATOR CLASSIFIER

LAUNDER TYPE

The Launder Type Classifier is intended to be bolted to the bottom of the mill launder that carries the pulp to the concentrating tables. It is a single compartment classifier and the pulp for each table is drawn through one of these classifiers, with the result that the feed to each table is in the best possible condition for good table work.

These Classifiers are made with several sizes of settling pockets to be bolted to the bottom of launders 8 inches inside and wider, and with sorting columns suitable for all different sizes of table feeds.

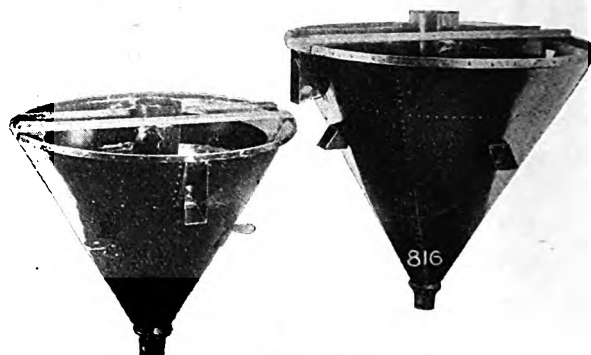


FIG. 3695

OVOCA SAND SLIME SEPARATOR

MADE IN CAPACITIES OF FROM 3 TO 10 TONS PER HOUR

Operated in closed circuit with a Ball Mill increases capacity of mill and regulates fineness of crushed product.

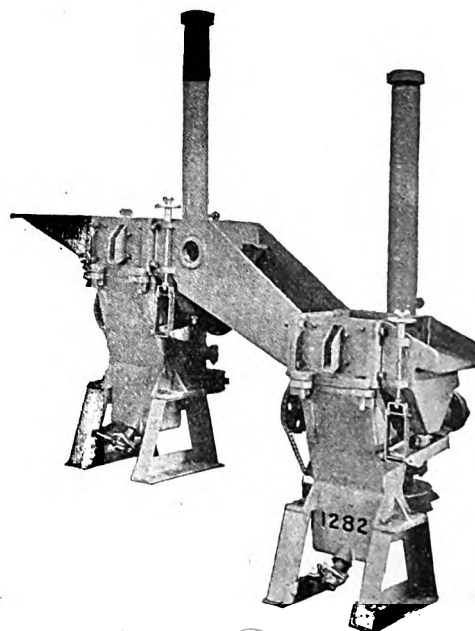
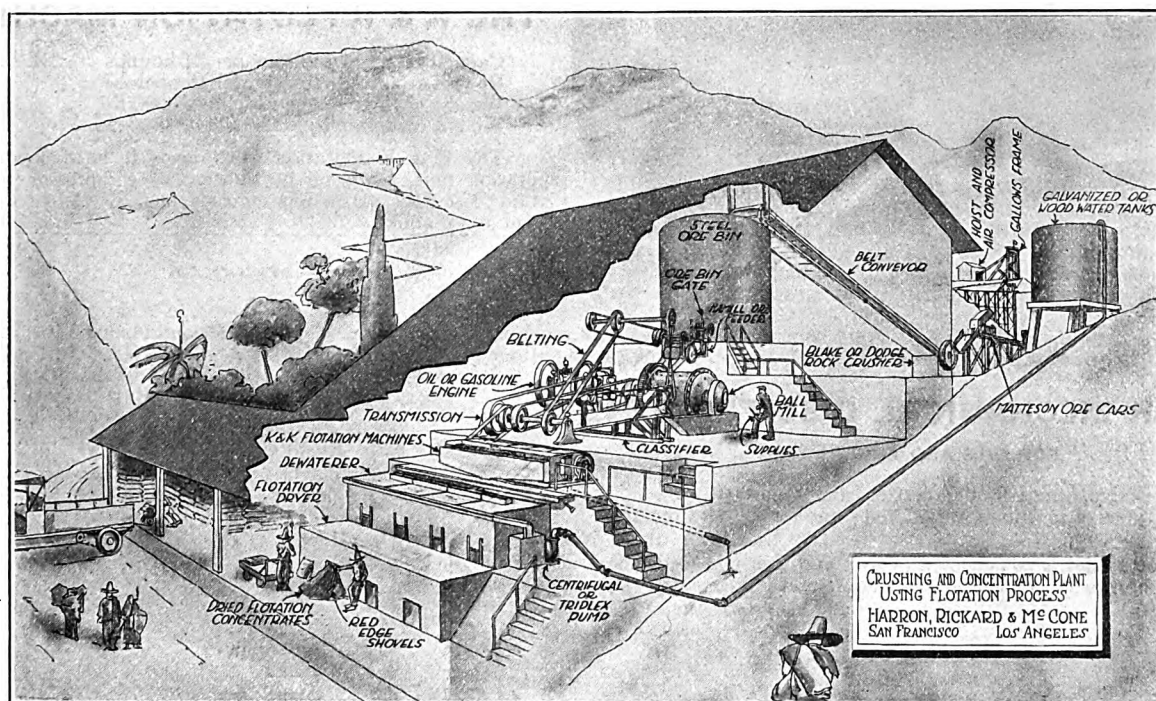


FIG. 3696

EVERYTHING FOR THE MINE AND MILL



The above cut shows the arrangement of a small complete Crushing and Flotation Concentration Plant and a few of the Machines and Supplies that we can furnish for the Mine and Mill.

We are in position to furnish equipment of all kinds for Crushing and Concentration Plants of any capacity. We are also in position to furnish from stock, equipment and supplies of all kinds for all Mining work.

Below is a partial list of the many lines of Mining Equipment carried in stock for immediate delivery:

Abbe-Frenier Spiral Pumps
 Agitators
 Air Drills
 Aldrich Pumps
 Ball Mills
 Bear Brand Leather Belting
 Blake Type Rock Breakers
 Blowers
 Boilers
 Bucket Cars
 Bulldog Drill Steel
 Burmaline Belting
 Bury Air Compressors
 Cameron Sinking Pumps
 Centrifugal Pumps
 Classifiers
 Cochise Rock Drills
 Compressed Air Hoists
 Deflectors
 Dodge Rock Breakers
 Electric Hoists
 Emery Mills
 Flotation Blowers
 Frenier Sand Pumps
 Gasoline Engines
 Hamill Ore Feeders
 Hardinge Conical Ball & Pebble Mills
 Hydraulic Giants
 Hydraulic Gravel Elevators

Jigs
 K & K Flotation Machines
 Matteson Ore Cars
 Mine Cars
 Motors
 Newaygo Separators
 New Improved Huntington Mills
 Oil Engines
 Ore Buckets
 Ore Cars
 Red Edge Shovels
 Revolving Grizzlies
 Rock Drills
 Sample Grinders
 Sand Slime Separators
 Settling Cones
 Skips
 Slime Settling Cones
 Slime Separators
 Steam Engines
 Steam Hoists
 Stopping Drills
 Sturtevant Grinding & Crushing Machinery
 Thickeners
 Timber Framers
 Transmission Machinery
 Turbine Water Wheels
 Water Gates
 Wilfley Concentrators

MACHINE SHOP EQUIPMENT, BLACKSMITH SHOP EQUIPMENT AND WOODWORKING EQUIPMENT, SMALL TOOLS AND SUPPLIES OF ALL KINDS.

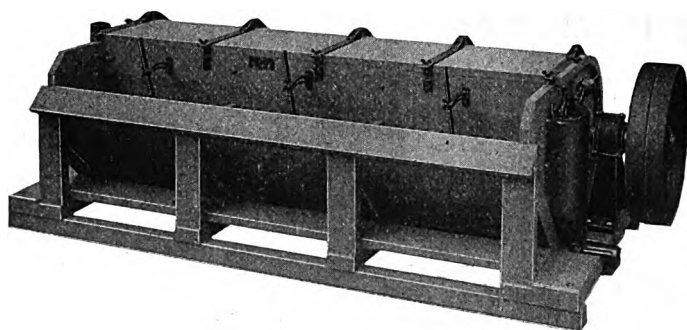


FIG. 3699

THE K & K FLOTATION MACHINE

Capacity: 80 to 150 tons per 24 hours.
 Requires: 6 to 8 Horsepower to operate.
 Weight of Steel Type Machine, 3500 lbs.
 Weight of Wood Type Machine, 3300 lbs.

The K & K Flotation Machine is in itself a complete flotation unit, requiring no blower, air compressor or agitation. The floor space required is 4 feet by 14 feet and the head room about 3 feet.

K & K MECHANICAL DISC FEEDER

FOR OILS AND ACIDS

Grit, sludge, or any foreign matter cannot choke it. Two types of machines are offered—one for Oil and one for Acid.

The oil feeder is constructed of iron and the acid feeder of lead and bronze to withstand the action of the reagents.

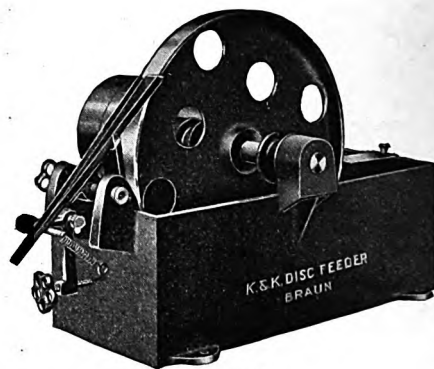


FIG. 3700

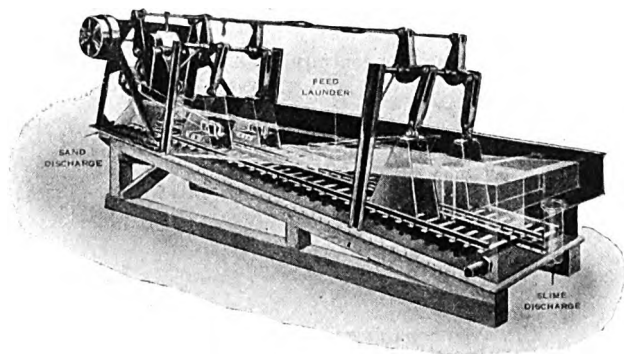


FIG. 3701

DORR CLASSIFIERS

The means for adjusting the Dorr Classifier give great flexibility in the products made by its use, and enables it to handle a wide variety of materials, and to produce products varying from 28-mesh and finer to practically a 300-mesh slime.

Sizes range from quarter size simplex for laboratory work and small tonnages up to 1600 tons of feed a day when making a separation at 48-mesh.

DORR AGITATORS

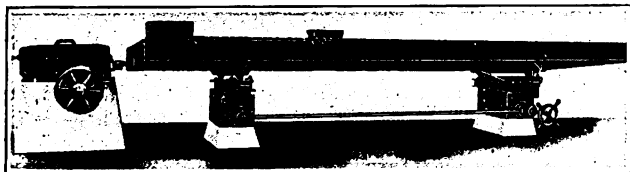
Dorr Agitators can be furnished in sizes for small laboratory equipment up to machines for tanks 40 feet in diameter by 25 feet in depth and are made in acid proof construction for use in the leaching of copper, zinc and other ores and in chemical plants where acid liquors are handled. The Dorr Agitator is used not only in the treatment of ores, but also in various chemical industries, such as, the causticizing of soda ash with lime, etc.



FIG. 3702

THE WILFLEY CONCENTRATORS

NOS. 5, 6, 9, 11-D AND 13



NO. 11-D FIG. 5167

The No. 5 table is equipped with a heavy timber under-structure.

The No. 6 is equipped with a steel channel under-structure; and the 11-D is designed for setting on concrete piers. The design of the No. 11-D table is such that the shipping weight is reduced 40 per cent of that of the No. 6 steel-frame table; and for this reason is especially desirable for the foreign and isolated operator.

The No. 9 Double-Deck Wilfley Concentrating Table has a capacity of two single-deck tables and is intended for use where available floor space is limited.

The capacity of each table varies with the character of the ore, the fineness to which it is crushed, and the treatment to which it has been previously subjected.

No. 13 is the laboratory table equipped with enclosed self-oiling head motion, tight and loose drive pulleys, and supplied with two decks each 30 inches by 13 inches—one riffled for coarse and one riffled for the concentration of fine feeds.

RIGHT AND LEFT HAND TABLES

A right-hand table has the feed box on the right hand corner, when viewed from the head motion end. A left-hand table has the feed box on the left hand corner, when viewed from the head motion end.

When ordering, always specify whether right or left-hand tables are wanted and the quantity of each.

ROOTS BLOWERS

FOR LOW PRESSURE — BELTED OR MOTOR DRIVEN

These machines are used for large oil or gas furnaces and similar installations, which require pressures not exceeding one and one-half pounds. Built in either the horizontal or vertical type, and all horizontal machines are furnished with relief valve.

FOR HIGH PRESSURE — BELTED OR MOTOR DRIVEN

High Pressure Blowers are used for Filtration, Agitation of Liquids, Ice-Making, and any service requiring air at pressures from three and one-half pounds to five pounds. These Blowers are furnished only in the horizontal type.

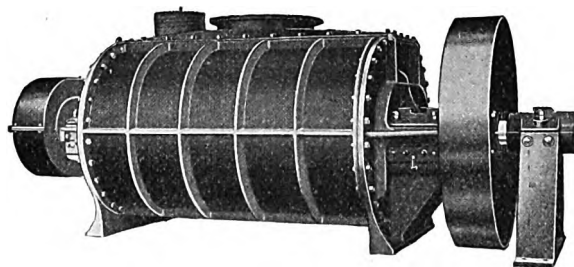


FIG. 3657

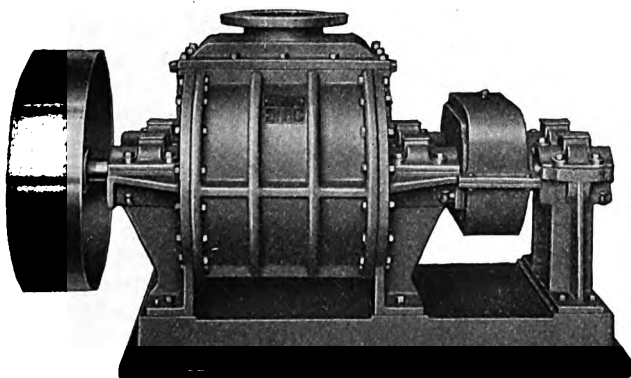


FIG. 3658

ROOTS FLOTATION TYPE BLOWERS

This cut illustrates a blower designed for this particular service. It is very simple and complete. The gears run in a bath of oil in oil-tight housings. The double outer bearing mounted with Blower on a heavy cast iron base gives rigidity and permits steady night and day service. The bearings in the double outer bearing are the same as those on the blower. It is a complete blower unit for this class of work.

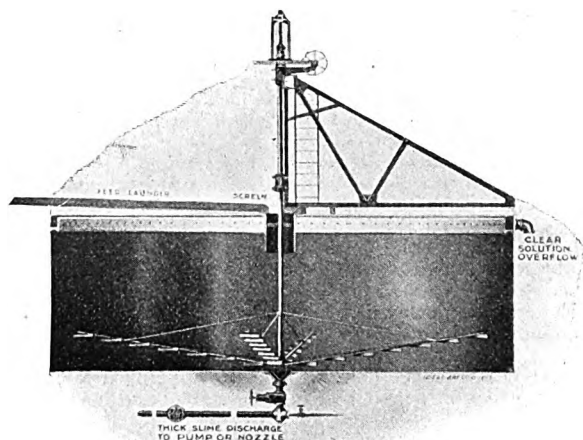


FIG. 3703

FRENIER SPIRAL SAND PUMPS

MADE IN NINE SIZES: NOS. 1 TO 9 INCLUSIVE
CAPACITY: 3000 TO 5500 GALLONS PER HOUR

For pumping sand, crushed ore and pulp in wet state. Slimes and tailings for pumping battery sands to vanners, cyanide tanks, etc.

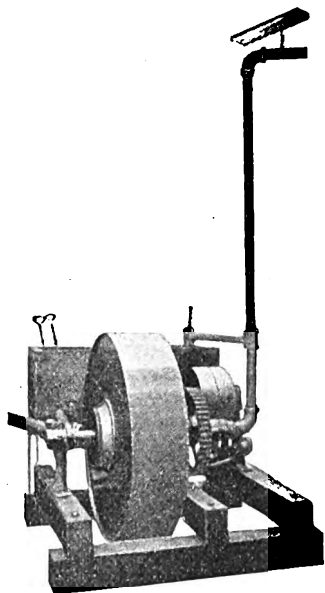


FIG. 3705

DIAPHRAGM SLIME PUMPS

Made in two sizes: Nos. 3 and 4 and with either bottom or side suction as desired. Approximate maximum displacement per revolution: No. 3, 225 cubic inches; No. 4, 400 cubic inches.

DORR THICKENERS

Dorr Thickeners are made in sizes from small laboratory machines up to mechanisms for use in tanks 130 feet and larger in diameter, and can be made of acid-resisting materials where required.

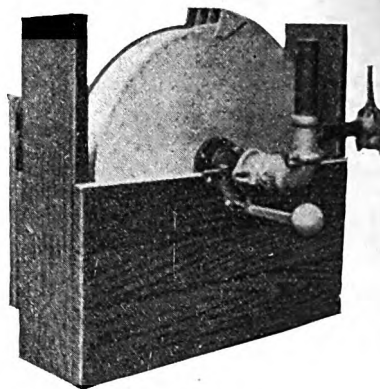


FIG. 3704

ABBE-FRENIER SPIRAL PUMPS

MADE IN FOUR SIZES
CAPACITY: 25 TO 90 GALLONS PER MINUTE

For elevating Battery and Tube Mill Sands, Mill Pulp, Crushed Ores, Slimes and Tailings and gritty and sandy liquids of all kinds.

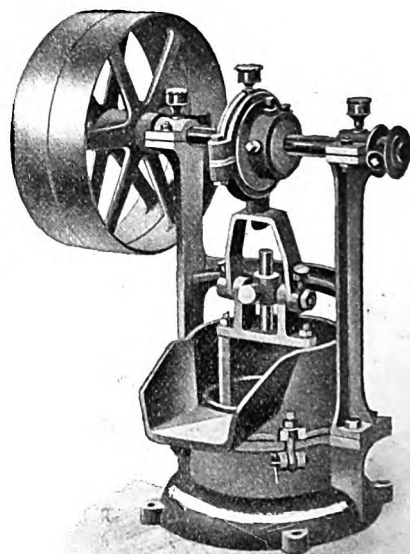
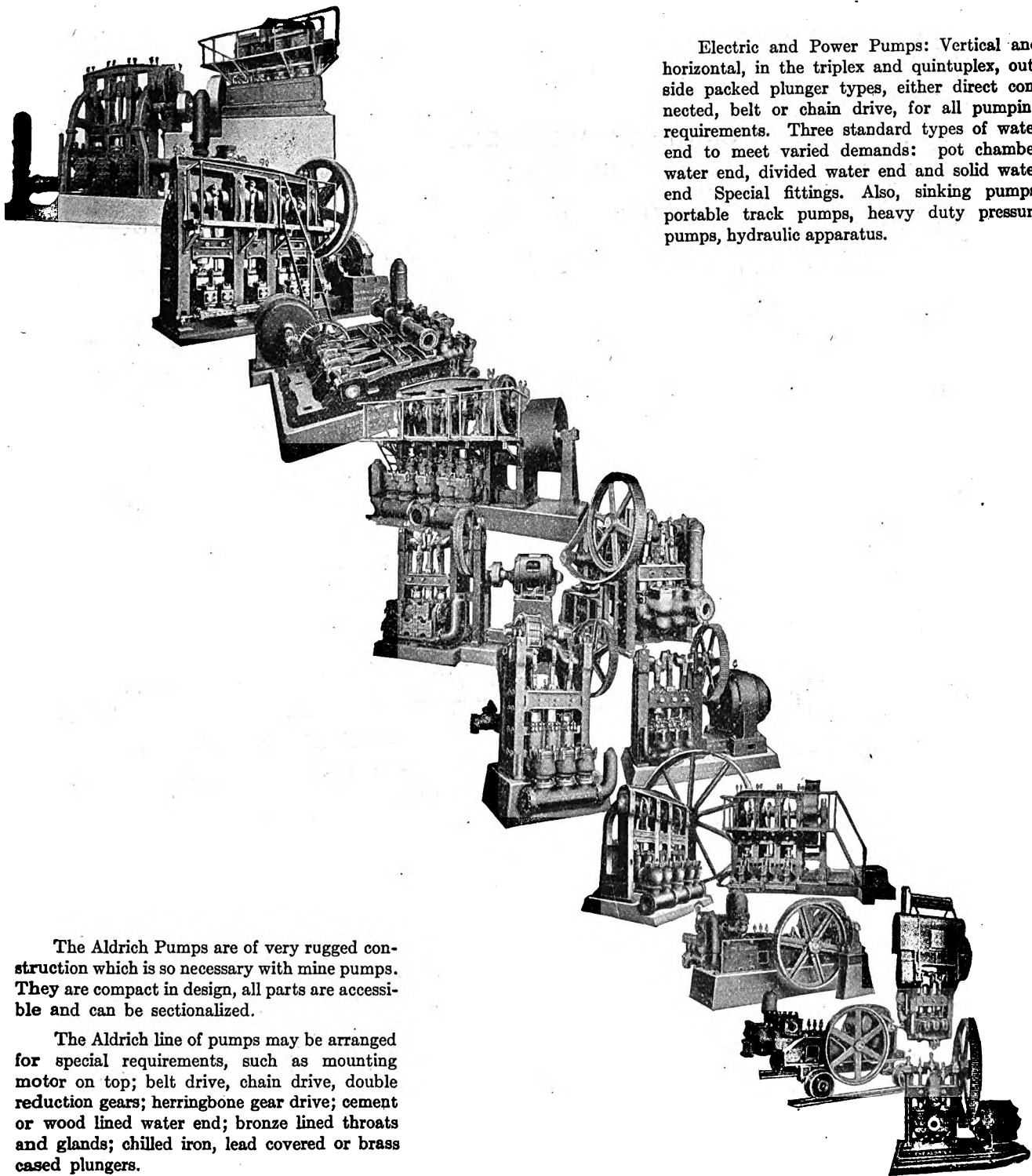


FIG. 3706

ALDRICH PUMPS



Electric and Power Pumps: Vertical and horizontal, in the triplex and quintuplex, outside packed plunger types, either direct connected, belt or chain drive, for all pumping requirements. Three standard types of water end to meet varied demands: pot chamber water end, divided water end and solid water end. Special fittings. Also, sinking pumps, portable track pumps, heavy duty pressure pumps, hydraulic apparatus.

The Aldrich Pumps are of very rugged construction which is so necessary with mine pumps. They are compact in design, all parts are accessible and can be sectionalized.

The Aldrich line of pumps may be arranged for special requirements, such as mounting motor on top; belt drive, chain drive, double reduction gears; herringbone gear drive; cement or wood lined water end; bronze lined throats and glands; chilled iron, lead covered or brass cased plungers.

FIG. 3707

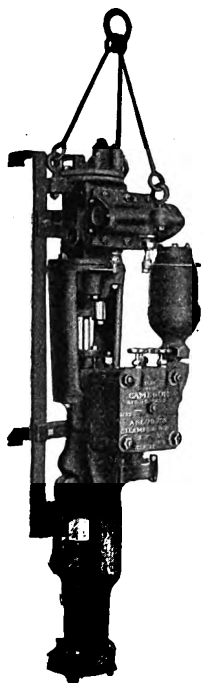


FIG. 3708
CAMERON
SINKING PUMP

CAMERON VERTICAL PLUNGER SINKING PUMPS

CAPACITY: 28 TO 330 GALLONS PER MINUTE

The Prospectors' Sinking Pump shown is designed to meet the requirements of those who need a sinking pump for prospecting or any situation where a pump of larger capacity is unnecessary.

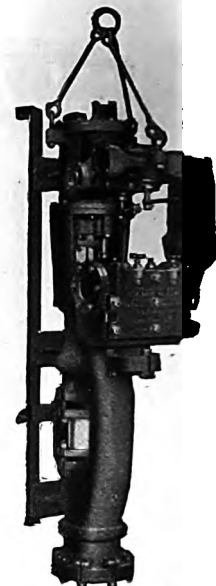


FIG. 3709
PROSPECTORS
SINKING PUMP

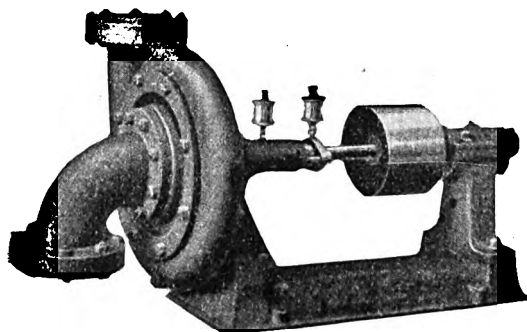


FIG. 3710

STANDARD IMPROVED HORIZONTAL CENTRIFUGAL BELTED AND DIRECT CONNECTED PUMPS

MADE IN SIZES OF 1 TO 12 INCHES.

CAPACITY: 25 TO 4500 GALLONS PER HOUR

In ordering pumps for direct connection to motors, it is necessary to give us the total head, capacity and speed, as a mistake in the head will alter the capacity of the pump.

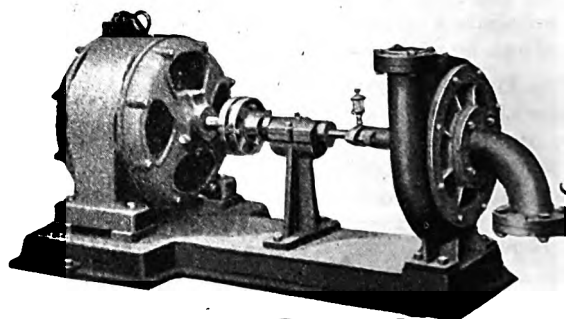


FIG. 3711

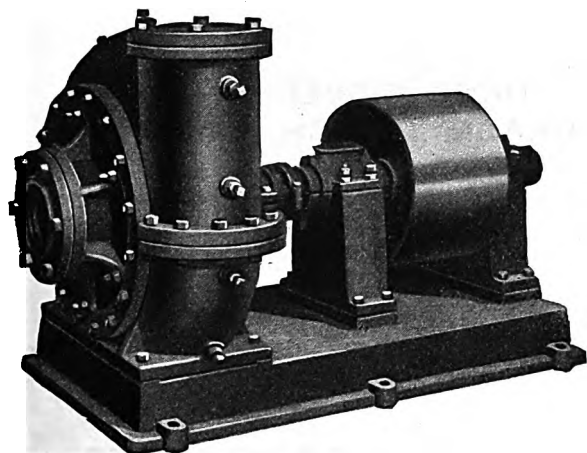


FIG. 3712

MORRIS CENTRIFUGAL PUMPS

Standard Centrifugal Pumps, for handling water or sewage; belt, steam, turbine, electric or gasoline motor driven; horizontal or vertical shaft; submerged, or side or double suction type; single stage or multistage; low or high lift; high or low pressure; horizontally split.

Special Centrifugal Pumping Outfits—The pumping outfit can be furnished complete, including driving engine, turbine or motor, or the pump only, adapted to engine or motor.

THE C. H. & E. POWER DRIVEN CENTRIFUGAL PUMP

Can be furnished in five sizes: 3,600 gallons, 40-foot lift; 7,000 gallons, 40-foot lift; 12,000 gallons, 30-foot lift; 12,000 gallons, 50-foot lift and 15,000 gallons, 30-foot lift.

Where a greater lift of water is required over that of the Bilge trench pump, this centrifugal power-driven outfit will fill the demand. The conditions under which centrifugal pumps are used vary considerably. We are giving but one view here, a 2½-inch suction pump, chain-driven, in connection with a C. H. & E. 4 H.P., 4-cycle water hopper cooled gasoline engine.

To give correct recommendations regarding an outfit best adapted to the individual requirements, full information as to capacity wanted, nature of fluid to be pumped, total head including suction and discharge, suction lift in feet, etc., must be given.

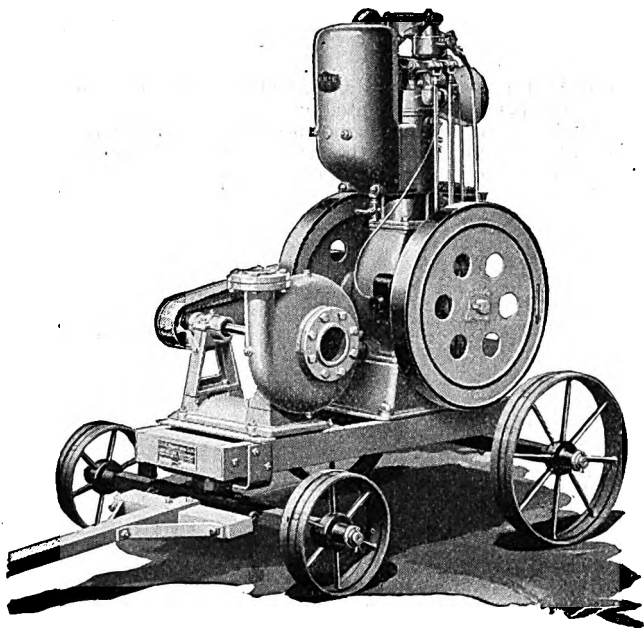


FIG. 5133

PULSOMETER STEAM PUMPS

For Contractors' work, Quarries, Brickyards, Sewage Deposit, Collieries, Paper Mills, Railroads, Sinking and Irrigation Work.

Pumps practically anything that will flow. It handles water running 25, 30, 35, and 40% solid matter. Equipped with the special clapper valve, it easily pumps 40% sand. Furthermore it will lift **by suction** water containing mud, sand, grit, pebbles, or refuse, in the above-mentioned proportions, twenty feet or more—and **will not** lose suction on account of large quantities of air mixed with the material.



FIG. 3721

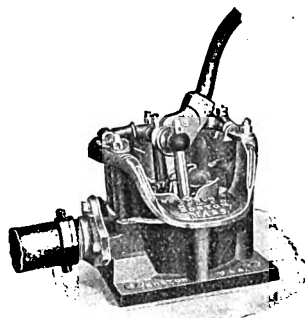


FIG. 3722

HAND POWER DIAPHRAGM TRENCH PUMPS

These pumps are used by Contractors, Railroad Builders, City and Government Departments and others on account of their ability to handle water containing sand, mud or dirt without choking. They are unquestionably the best apparatus for moving large quantities of water quickly and economically by hand power.

Made in three sizes:

No. 2, One Man—1800 gallons per hour
 No. 3, One Man—4000 " " "
 No. 4, Two Men—6000 " " "

C. H. & E. POWER DRIVEN DIAPHRAGM BILGE TRENCH PUMP

WORM GEAR DRIVEN—RUNS IN OIL AND GREASE—NO EXPOSED GEARS

Can be furnished in two sizes, 3,000 gallons per hour and 6,000 gallons per hour. Mounted on trucks or skids.

Note how compact the engine and pump are mounted on the cast iron base, which carries the gasoline and forms the base of pump. Two men can carry this pump with ease.

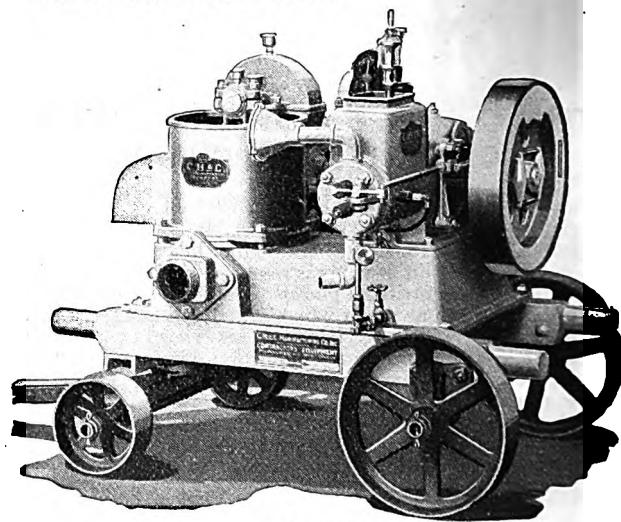


FIG. 3715

DOWNIE DEEP WELL PUMPS

SINGLE AND DOUBLE STROKE—STEAM AND POWER DRIVEN—PATENTED CONICAL PLUNGER VALVES

For supplying Cities, Ice Plants, Coke Plants, Railroad Pumping Stations, Factories, etc., where large quantities of water are required to be raised from deep artesian wells at a minimum cost. Can be operated by any kind of power, belted or direct geared, gas or gasoline engine, oil engine, electric motor or steam direct. Pumps, Working Barrels, Valves, Sucker Rods and Tubing of all sizes can be furnished.

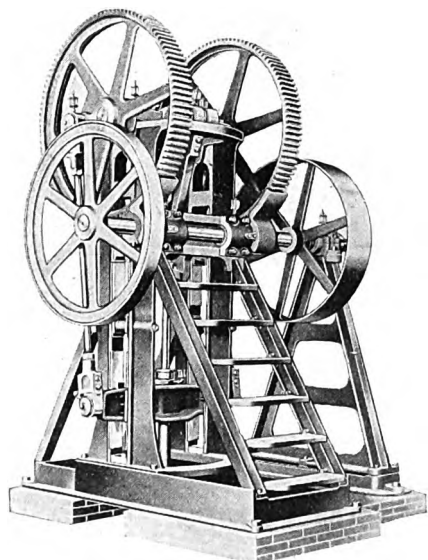


FIG. 3720

DUPLEX PUMPS

FOR BOILER FEED AND GENERAL SERVICE

We can furnish Duplex and other pumps for boiler feeding, oil pumping, tank service and all general purposes. In writing give us full details of your particular work including capacity, suction and discharge heads. Any size desired can be furnished.

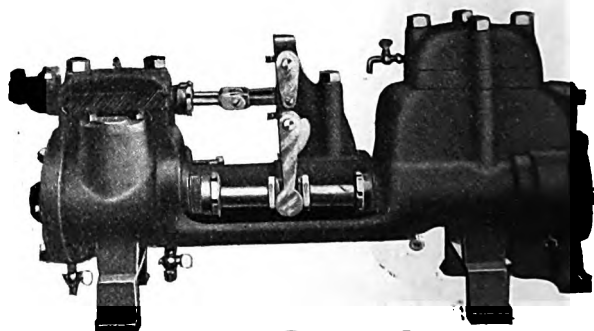


FIG. 3723

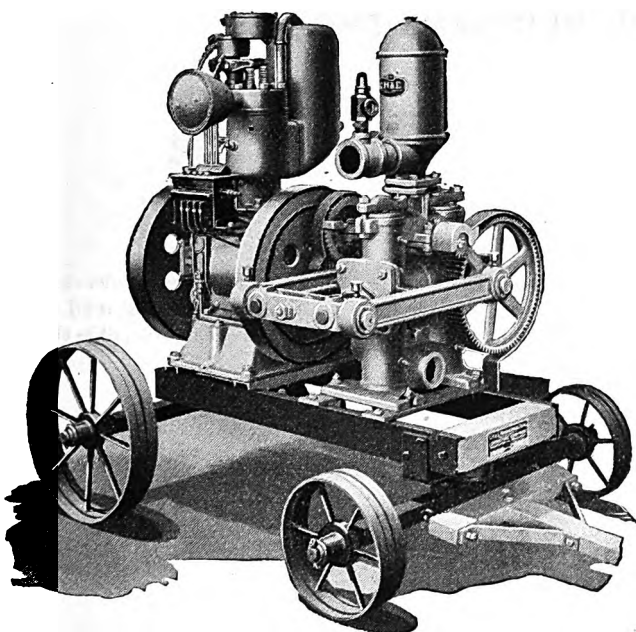


FIG. 5134

C. H. & E. POWER DRIVEN TRIPLEX PUMP

Can be furnished in three sizes: 1,500 gallons, 460 feet maximum elevation; 2,400 gallons, 460 feet maximum elevation; and 3,600 gallons, 350 feet maximum elevation.

Concrete roads and water-bound macadam roads now so extensively being built, require a great deal of water in their construction. The water supply is often quite a distance from where it is needed, and to get it to this point at all times, both for the mixer and for sprinkling the new laid road, requires a dependable and efficient pump.

Manufactured in three different sizes, to meet the demand of contractors, where a high pressure outfit is required.

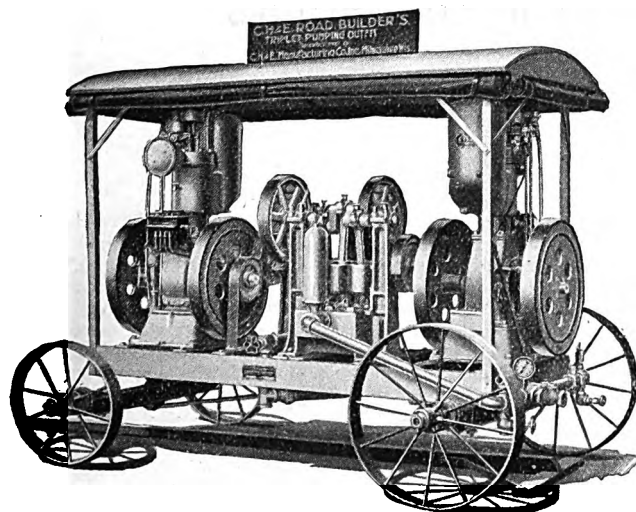


FIG. 5136

C. H. & E. POWER DRIVEN PISTON FORCE PUMP

Can be furnished in four sizes, capacities 900 to 3,600 gallons per hour.

For small pumping stations, road building, railway supply systems, small irrigation plants and country homes.

Will pump water to a distance of from two and a half to three miles. In writing for information on either the piston force pump or triplex pump outfit, be sure to advise distance that the pump is placed from the water, the number of feet the water is to be lifted and the amount of water required per hour.

These outfits are mounted on either skid or channel iron truck.

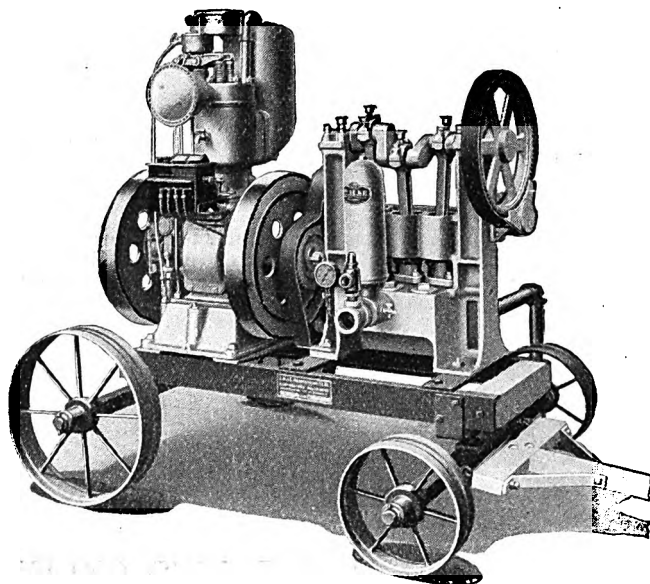


FIG. 5135

C. H. & E. POWER DRIVEN TRIPLEX PUMP

DUAL SYSTEM

The latest development in a pumping plant for the road builder. It consists of two duplicate triplex pumping outfits, complete mounted on a truck operating independent of each other except that they are piped to a common suction and discharge pipe. Furnished in one size, 2,400 gallons per hour for each pump, 460 feet maximum elevation. Equipped with two 7 H.P. kerosene engines.

HERCULES GASOLINE AND KEROSENE ENGINES

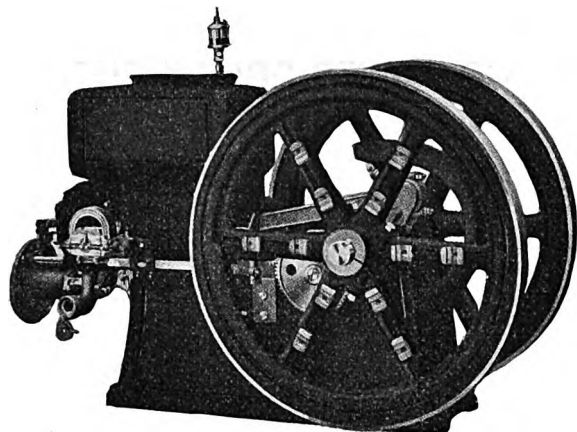


FIG. 3777

Horsepower Sizes:

3, 5, 7, 9 and 12 Kerosene.

1½, 3, 5, 7, 9 and 12 Gasoline.

All sizes above the 1½ H.P. are built with cylinder cast separate from base. The Webster tripolar magneto is used exclusively. The kerosene carburetor or mixer makes possible the successful use of kerosene.

MIETZ & WEISS OIL ENGINES

Built both horizontal and vertical from 2 to 400 Horsepower. With 1, 2, 3, and 4 Cylinders.

These Engines operate on Kerosene, Fuel Oil, Distillate, Crude Oil, or Alcohol.

Also built in Marine Type in sizes from 2 to 600 Horsepower. Mietz & Weiss Oil Engines are extensively used by the U. S. and Foreign Governments. Engines aggregating over 200,000 Horsepower in operation.

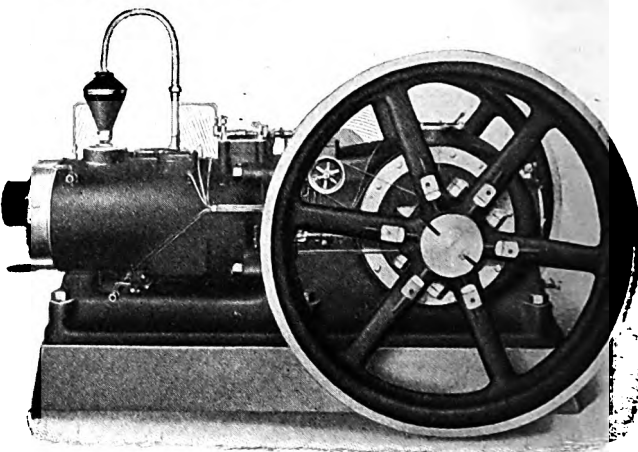


FIG. 3781

C. H. & E. TWO CYLINDER KEROSENE ENGINES

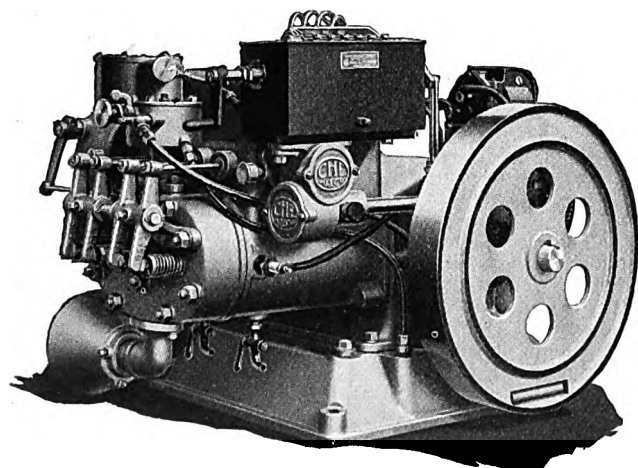


FIG. 5137

8 Horsepower.

A power which for steadiness is comparable only to the electric motor is the kind of power furnished by this engine. Is of the throttling governor type, and having two cylinders there is an explosion for each revolution. Has forced feed lubrication to the cylinder and all crank-shaft bearings, thus dispensing with the troublesome and carbon-producing splash system in common use. High tension magneto equipped with starter coupling which gives a good hot spark no matter how slowly the engine is cranked when starting.

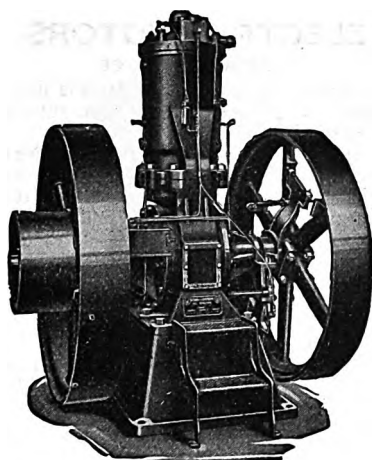


FIG. 3778

THE VENN-SEVERIN OIL ENGINES

SIZES: 9 TO 170 HORSEPOWER IN STATIONARY AND MARINE TYPES

Any kerosene or fuel oil liquid enough to flow freely, like water, through the pipes, will operate satisfactorily. All troublesome valves, gears, timing and mixing devices, batteries and magnetos requiring experienced attention are eliminated.

C. H. & E. KEROSENE ENGINE

HORSEPOWER SIZES: 3, 5 AND 7.

While this engine was designed especially for kerosene it uses gasoline with equal efficiency. The structural features which result in the high efficiency and reliability are forced feed lubrication to the cylinder, and all crankshaft bearings; high tension magneto equipped with starter coupling gives a good hot spark no matter how slowly the engine is cranked when starting. Both valves located in the head and automatically operated.

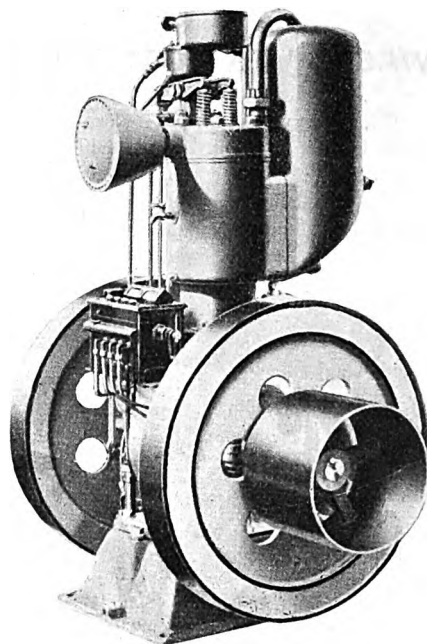


FIG. 5138

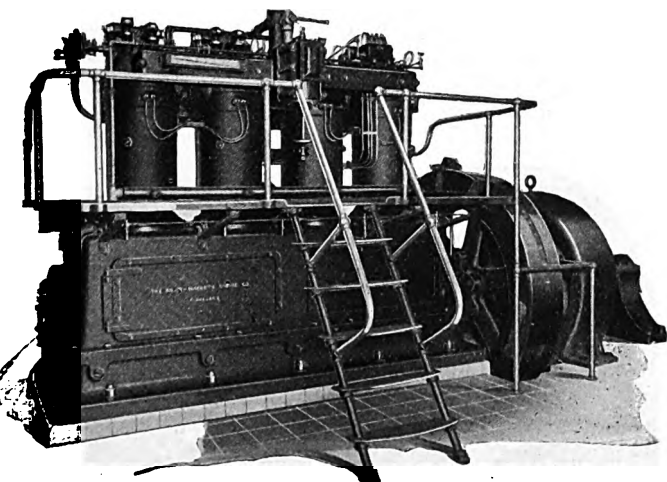


FIG. 3780

BRUCE-MACBETH GAS ENGINES

SIZES: 50 TO 350 HORSEPOWER

Available for operation on Natural Gas, Artificial or City Gas, Gasoline and Producer Gas, using gas generated direct from coal. Engines are of the vertical type, smaller sizes having two cylinders and the larger sizes, four cylinders.

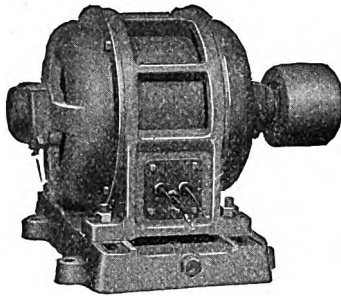


FIG. 3785

ELECTRIC MOTORS

FOR ANY SERVICE

Direct or Alternating Current for driving line shafts, machine tools, pumps, compressors, hoists, concrete mixers, wood-working machinery, blowers, etc.

We can furnish any type of motor desired, to operate any style of machine. These machines are strong and durable and represent the latest designs in motor construction. When ordering motors give the following information:

Horsepower,
Speed of Motor,
Voltage,
Cycles } if A.C.
Phase }
Voltage-if D.C.

If pulley or base is required. Type of starter required.

WACHS VERTICAL STEAM ENGINES

Can be furnished in two styles, viz: Side Crank and Center Crank in pairs or doubles; also single or double engines with link motion. Combined outfits of engine and boiler on one base can also be furnished. Made in medium and high speed types. Especially valuable to manufacturers of Ice Machines, Centrifugal Pumps and Fans as they are easily built into direct connected units.

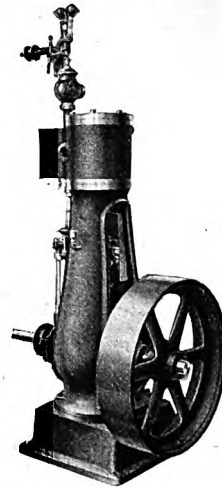


FIG. 3782

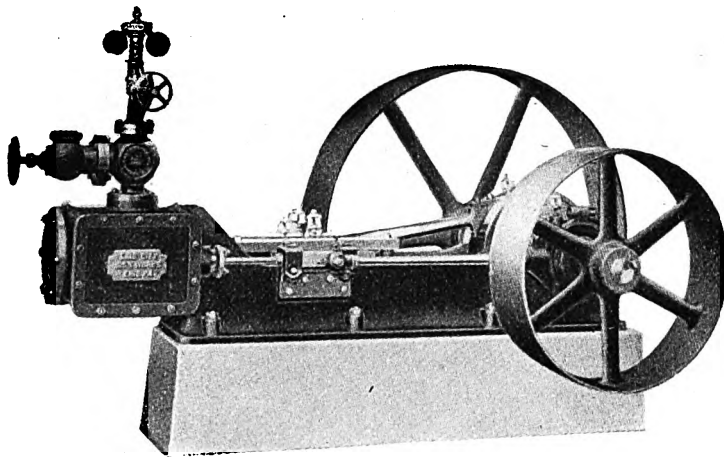


FIG. 3783

CENTER CRANK THROTTLING ENGINE

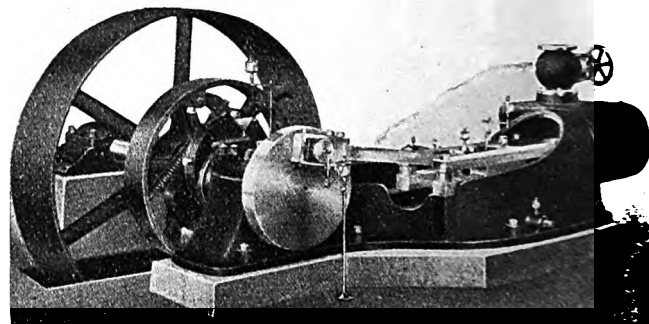
SIZES: 12 TO 125 HORSEPOWER

This is a strong, well-proportioned center-crank engine. It is self-contained and requires little attention or adjustment. Every engine is thoroughly tested under steam before it leaves the factory.

TANGYE BED THROTTLING ENGINE

SIZES: 45 TO 300 HORSEPOWER

A high grade slide valve throttling engine, with large steam ports, balanced valve, governor, steam and exhaust pipes, so that full capacity is available. Also made as Automatic.



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FIG. 3786

HORIZONTAL TUBULAR STATIONARY BOILERS

SIZES: 20 TO 200 HORSEPOWER

These boilers are constructed in accordance with A.S.M.E. Rules or to standard builders' ratings. Can be obtained with half arch, full arch or Dutch oven settings, also with full steel casing setting. Usual pressures 100, 125 and 150 pounds per square inch.

VERTICAL TUBULAR BOILERS

SIZES: 4 TO 110 HORSEPOWER

Built in conformance with A.S.M.E. Rules or to standard builders' ratings and for all pressures.

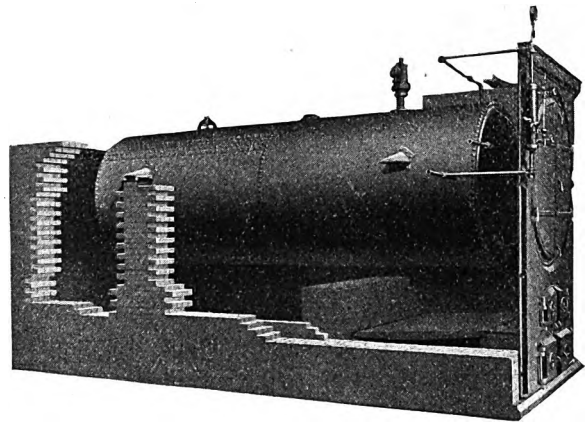


FIG. 3787

HORIZONTAL INTERNALLY FIRED BOILERS

RETURN TUBULAR OR SCOTCH MARINE TYPE, WITH DRY BACK

SIZES: 6 TO 100 HORSEPOWER

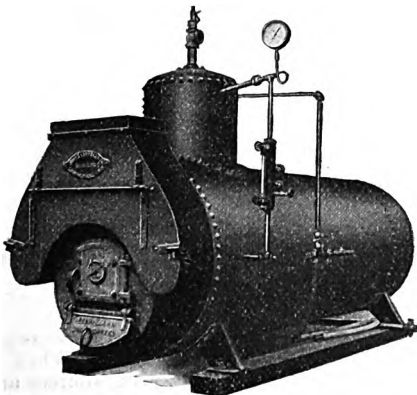


FIG. 3788

These are constructed for 100 and 125 pounds working pressure—to A.S.M.E. Rules or standard builders' ratings. Their installed cost is less than bricked-in boilers and they are especially recommended for small factory installations, hotels, apartments, and packing plants.

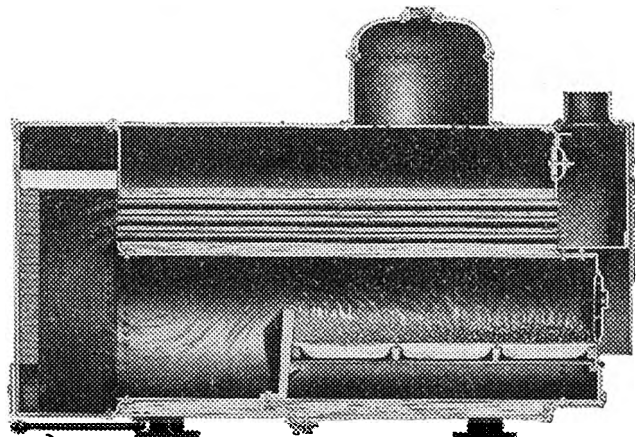


FIG. 3789

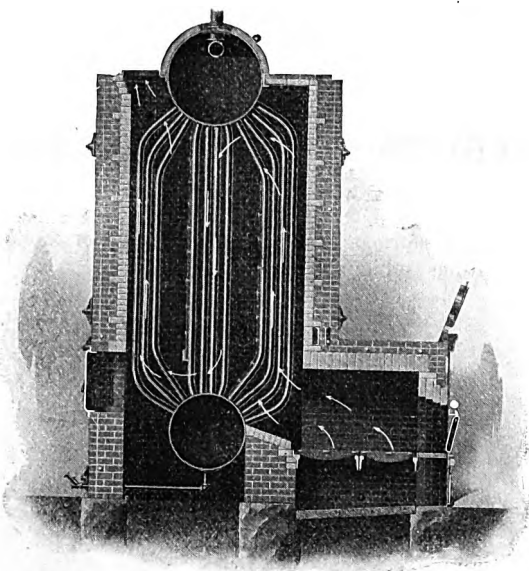


FIG. 3790

CLOSED COPPER COIL FEED WATER HEATERS

SIZES: 5 TO 3000 HORSEPOWER

When writing for prices, state boiler horsepower, temperature of feed water and source and final temperature desired. The manufacturers of this heater produce a varied line—Hot Water Service Heaters, Instantaneous Heaters, Storage Heaters, especially made for laundries, Oil Heaters—for plants burning fuel oil.

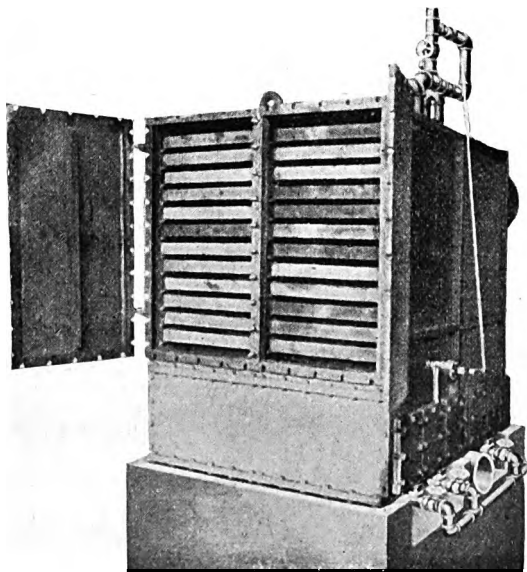


FIG. 3792

VERTICAL WATER TUBE BOILERS

These boilers are regularly built for 150 lbs. working pressure, in units ranging from 125 horsepower to 750 horsepower. We can furnish higher pressures if wanted. The boiler is designed for the application of a superheater, when ordered. The simplicity of the boiler is its charm, and the wonderful results obtained in the production of dry steam at a minimum cost of fuel and maintenance commands the attention and admiration of steam engineers.

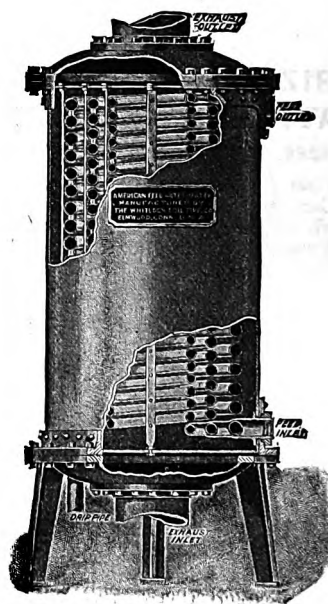


FIG. 3791

OPEN COIL FEED WATER HEATERS AND PURIFIERS

These open feed water heaters and purifiers are constructed in stock sizes from 100 to 4000 horsepower. When writing for prices give boiler horsepower to be served, sources and temperatures of water supply, amount and conditions of supply of exhaust or other steam available for heating purposes.

LEFFEL TURBINE WATER WHEELS

VERTICAL & HORIZONTAL DESIGNS FOR LOW, MEDIUM AND HIGH HEADS

HIGH SPEEDS—HIGH HORSEPOWER—HIGH EFFICIENCY—BUILT STRONG AND HEAVY

ALL PARTS STANDARDIZED

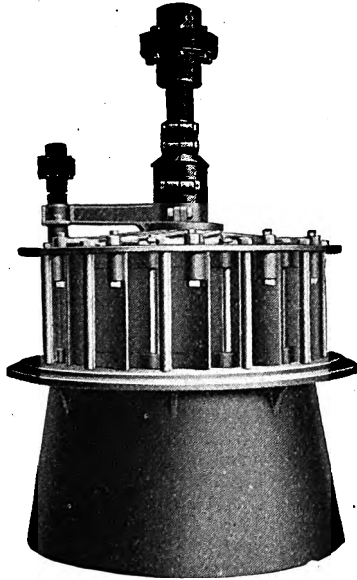


FIG. 3713
VERTICAL LEFFEL SAMSON TURBINE

VERTICAL LEFFEL TURBINE WATER WHEELS

Equipped with latest type of Leffel double steel bucket runners mounted on vertical steel shafts. The revolving parts of these turbines are carried on large top and bottom lignum-vitae step bearings. The gate casings are fitted with balanced swing type gates, each gate removable separately and fitted with adjustable steel connections. The gates are operated with Leffel's latest type of gate equipment. The bearings are of special designs and large dimensions.

HORIZONTAL LEFFEL TURBINES

Are built in various types and designs, single and double discharges. Frequently to suit requirements two or more turbines are built on one horizontal shaft, developing large horsepower and high speeds, for direct connection to driven machinery. Some of these turbines are constructed with steel casings and others for open penstocks.

TYPE "Z" LEFFEL TURBINES

These turbines of special design for developing high speed, high horsepower, high efficiencies; vertical and horizontal designs, for direct connection to electric generators, milling machines, saws, grinders, pumps and other high speed machinery. These turbines are of the most modern and latest designs in all details.

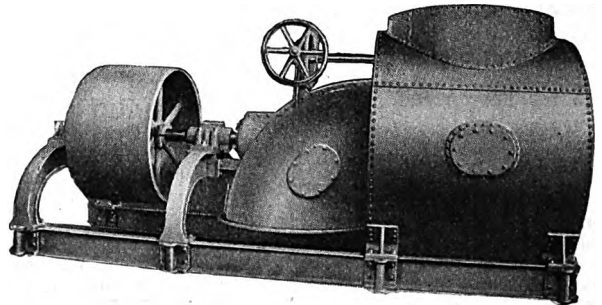


FIG. 3714
HORIZONTAL LEFFEL SAMSON TURBINE

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USEFUL INFORMATION

U. S. STANDARD THREAD

Formula:

$$p = \text{pitch} = \frac{1}{\text{No. threads per inch}}$$

$$d = \text{depth} = p \times .6495$$

$$f = \text{flat} = \frac{p}{8}$$

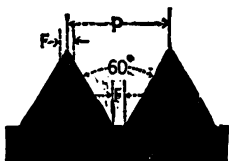


FIG. 2502

Diameter.....	1/4	5/16	3/8	7/16	1/2	5/8	3/4	7/8
No. Threads per in....	20	18	16	14	13	12	11	9
Diameter.....	1	1 1/8	1 1/4	1 3/8	1 1/2	1 5/8	1 3/4	2
No. Threads per in....	8	7	7	6	6	5 1/2	5	4 1/2
Diameter.....	2 1/8	2 1/4	2 3/8	2 1/2	2 5/8	2 3/4	2 7/8	3
No. Threads per in....	4 1/2	4 1/2	4	4	4	4	3 1/2	3 1/2
Diameter.....	3 1/4	3 3/8	3 1/2	3 5/8	3 3/4	3 7/8	4	...
No. Threads per in....	3 1/2	3 1/4	3 1/4	3 1/4	3	3	3	...

SHARP V THREAD

Formula:

$$p = \text{pitch} = \frac{1}{\text{No. threads per inch}}$$

$$d = \text{depth} = p \times .8660$$

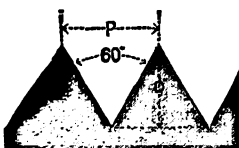


FIG. 2503

Diameter.....	1/4	5/16	3/8	7/16	1/2	5/8	3/4	7/8
No. Threads per in....	20	18	16	14	12	11	11	10
Diameter.....	1	1 1/8	1 1/4	1 3/8	1 1/2	1 5/8	1 3/4	2
No. Threads per in....	9	9	8	7	7	6	5	4 1/2
Diameter.....	2	2 1/8	2 1/4	2 3/8	2 1/2	2 5/8	2 3/4	3
No. Threads per in....	4 1/2	4 1/2	4 1/2	4 1/2	4	4	4	3 1/2
Diameter.....	3 1/4	3 3/8	3 1/2	3 5/8	3 3/4	3 7/8	4	...
No. Threads per in....	3 1/2	3 1/4	3 1/4	3 1/4	3	3	3	...

WHITWORTH STANDARD THREAD

Formula:

$$p = \text{pitch} = \frac{1}{\text{No. threads per inch}}$$

$$d = \text{depth} = p \times .64033$$

$$r = \text{radius} = p \times .1373$$



FIG. 2504

Diameter.....	1/4	5/16	3/8	7/16	1/2	5/8	3/4	7/8
No. Threads per in....	20	18	16	14	12	11	11	10
Diameter.....	1	1 1/8	1 1/4	1 3/8	1 1/2	1 5/8	1 3/4	2
No. Threads per in....	9	9	8	7	7	6	5	4 1/2
Diameter.....	2	2 1/8	2 1/4	2 3/8	2 1/2	2 5/8	2 3/4	3
No. Threads per in....	4 1/2	4 1/2	4	4	4	4	3 1/2	3 1/2
Diameter.....	3 1/4	3 3/8	3 1/2	3 5/8	3 3/4	3 7/8	4	...
No. Threads per in....	3 1/2	3 1/4	3 1/4	3 1/4	3	3	3	...

SOCIETY OF AUTOMOBILE ENGINEERS

S. A. E. (FORMERLY A. L. A. M.) STANDARD THREAD

Formula:

$$p = \text{pitch} = \frac{1}{\text{No. threads per inch}}$$

$$d = \text{depth} = p \times .64952$$

$$f = \text{flat} = \frac{p}{8}$$

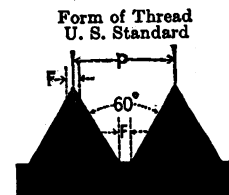


FIG. 2505

Diameter....	1/4	5/16	3/8	7/16	1/2	5/8	3/4	7/8	1
No. Threads per in....	28	24	24	20	20	18	18	16	14

AMERICAN SOCIETY OF MECHANICAL ENGINEERS

A. S. M. E. STANDARD THREAD

Formula:

$$p = \text{pitch} = \frac{1}{\text{No. threads per inch}}$$

$$d = \text{depth} = p \times .64952$$

$$f = \text{flat} = \frac{p}{8}$$

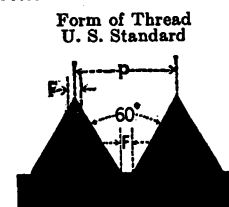


FIG. 2506

Size of Screw Gauge	0	1	2	3	4	5	6	7	8	9	10
No. Threads per in.	80	72	64	56	48	44	40	36	36	32	30
Size of Screw Gauge	12	14	16	18	20	22	24	26	28	30	
No. Threads per in.	28	24	22	20	20	18	16	16	14	14	

THE ACME STANDARD THREAD

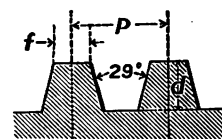


FIG. 2507

The Acme Standard Thread is an adaptation of the most commonly used style of Worm Thread and is intended to take the place of the square thread.

It is a little shallower than the Worm Thread, but the same depth as the square thread and much stronger than the latter.

The various parts of the Acme Standard Thread are obtained as follows:

Width of Point of Tool for Screw or Tap Thread = $\frac{.3707}{\text{No. of Thds. per in.}}$

Width of Screw or Nut Thread = $\frac{.3707}{\text{No. of Thds. per in.}}$

Diameter of Tap = Diameter of Screw + .020

Diameter of Tap or Screw at Root = $\frac{1}{\text{No. of Linear Thds. per in.}} + .020$

Depth of Thread = $\frac{1}{2 \times \text{No. of Thds. per in.}} + .010$

USEFUL INFORMATION

TABLES OF DECIMAL EQUIVALENTS

OF THE NUMBERS OF TWIST DRILL AND STEEL WIRE GAUGE

No.	Size of No. in decimals of in.	No.	Size of No. in decimals of in.	No.	Size of No. in decimals of in.	No.	Size of No. in decimals of in.	No.	Size of No. in decimals of in.
1	.2280	17	.1730	33	.1130	49	.0730	65	.0350
2	.2210	18	.1695	34	.1110	50	.0700	66	.0330
3	.2130	19	.1660	35	.1100	51	.0670	67	.0320
4	.2090	20	.1610	36	.1065	52	.0635	68	.0310
5	.2055	21	.1590	37	.1040	53	.0595	69	.02925
6	.2040	22	.1570	38	.1015	54	.0550	70	.0280
7	.2010	23	.1540	39	.0995	55	.0520	71	.0260
8	.1990	24	.1520	40	.0980	56	.0465	72	.0250
9	.1960	25	.1495	41	.0960	57	.0430	73	.0240
10	.1935	26	.1470	42	.0935	58	.0420	74	.0225
11	.1910	27	.1440	43	.0890	59	.0410	75	.0210
12	.1890	28	.1405	44	.0860	60	.0400	76	.0200
13	.1850	29	.1360	45	.0820	61	.0390	77	.0180
14	.1820	30	.1285	46	.0810	62	.0380	78	.0160
15	.1800	31	.1200	47	.0785	63	.0370	79	.0145
16	.1770	32	.1160	48	.0760	64	.0360	80	.0135

OF 8THS, 16THS, 32DS AND 64THS OF AN INCH

OF MILLIMETERS AND FRACTIONS OF MILLIMETERS

$$\frac{1}{100} \text{ mm.} = .0003937 \text{ inch}$$

8ths			mm. inches	mm. inches	mm. inches
$\frac{1}{8}$ = .125	$\frac{1}{16}$ = .0625	$\frac{1}{32}$ = .03125	$\frac{1}{32}$ = .009375	$\frac{1}{64}$ = .0046875	$\frac{1}{128}$ = .00234375
$\frac{1}{4}$ = .250	$\frac{1}{8}$ = .125	$\frac{1}{16}$ = .0625	$\frac{2}{32}$ = .01875	$\frac{2}{64}$ = .009375	$\frac{2}{128}$ = .0046875
$\frac{3}{8}$ = .375	$\frac{3}{16}$ = .1875	$\frac{3}{32}$ = .09375	$\frac{3}{32}$ = .0234375	$\frac{3}{64}$ = .0140625	$\frac{3}{128}$ = .00703125
$\frac{1}{2}$ = .500	$\frac{1}{4}$ = .250	$\frac{1}{8}$ = .125	$\frac{4}{32}$ = .03125	$\frac{4}{64}$ = .021875	$\frac{4}{128}$ = .0109375
$\frac{5}{8}$ = .625	$\frac{5}{16}$ = .3125	$\frac{5}{32}$ = .15625	$\frac{5}{32}$ = .0390625	$\frac{5}{64}$ = .02734375	$\frac{5}{128}$ = .013671875
$\frac{3}{4}$ = .750	$\frac{3}{8}$ = .375	$\frac{3}{16}$ = .1875	$\frac{6}{32}$ = .046875	$\frac{6}{64}$ = .03515625	$\frac{6}{128}$ = .017578125
$\frac{7}{8}$ = .875	$\frac{7}{16}$ = .4375	$\frac{7}{32}$ = .21875	$\frac{7}{32}$ = .0546875	$\frac{7}{64}$ = .04296875	$\frac{7}{128}$ = .021484375
	$\frac{1}{2}$ = .500	$\frac{1}{4}$ = .250	$\frac{8}{32}$ = .0625	$\frac{8}{64}$ = .0515625	$\frac{8}{128}$ = .02578125
	$\frac{1}{4}$ = .250	$\frac{1}{8}$ = .125	$\frac{9}{32}$ = .0703125	$\frac{9}{64}$ = .0578125	$\frac{9}{128}$ = .02890625
	$\frac{1}{8}$ = .125	$\frac{1}{16}$ = .0625	$\frac{10}{32}$ = .078125	$\frac{10}{64}$ = .063671875	$\frac{10}{128}$ = .0318359375
	$\frac{1}{16}$ = .0625	$\frac{1}{32}$ = .03125	$\frac{11}{32}$ = .0859375	$\frac{11}{64}$ = .06953125	$\frac{11}{128}$ = .034765625
	$\frac{1}{32}$ = .03125	$\frac{1}{64}$ = .015625	$\frac{12}{32}$ = .09375	$\frac{12}{64}$ = .07515625	$\frac{12}{128}$ = .0376953125
	$\frac{1}{64}$ = .015625	$\frac{1}{128}$ = .0078125	$\frac{13}{32}$ = .1015625	$\frac{13}{64}$ = .0809375	$\frac{13}{128}$ = .040625
	$\frac{1}{128}$ = .0078125	$\frac{1}{256}$ = .00390625	$\frac{14}{32}$ = .109375	$\frac{14}{64}$ = .08671875	$\frac{14}{128}$ = .0435546875
	$\frac{1}{256}$ = .00390625	$\frac{1}{512}$ = .001953125	$\frac{15}{32}$ = .1171875	$\frac{15}{64}$ = .0925	$\frac{15}{128}$ = .046484375
	$\frac{1}{512}$ = .001953125	$\frac{1}{1024}$ = .0009765625	$\frac{16}{32}$ = .125	$\frac{16}{64}$ = .0984375	$\frac{16}{128}$ = .0494140625
	$\frac{1}{1024}$ = .0009765625	$\frac{1}{2048}$ = .00048828125	$\frac{17}{32}$ = .1328125	$\frac{17}{64}$ = .104296875	$\frac{17}{128}$ = .05234375
	$\frac{1}{2048}$ = .00048828125	$\frac{1}{4096}$ = .000244140625	$\frac{18}{32}$ = .140625	$\frac{18}{64}$ = .11015625	$\frac{18}{128}$ = .0552734375
	$\frac{1}{4096}$ = .000244140625	$\frac{1}{8192}$ = .0001220703125	$\frac{19}{32}$ = .1484375	$\frac{19}{64}$ = .116015625	$\frac{19}{128}$ = .058203125
	$\frac{1}{8192}$ = .0001220703125	$\frac{1}{16384}$ = .00006103515625	$\frac{20}{32}$ = .15625	$\frac{20}{64}$ = .121875	$\frac{20}{128}$ = .0611328125
	$\frac{1}{16384}$ = .00006103515625	$\frac{1}{32768}$ = .000030517578125	$\frac{21}{32}$ = .1640625	$\frac{21}{64}$ = .127734375	$\frac{21}{128}$ = .0640625
	$\frac{1}{32768}$ = .000030517578125	$\frac{1}{65536}$ = .0000152587890625	$\frac{22}{32}$ = .171875	$\frac{22}{64}$ = .13359375	$\frac{22}{128}$ = .0669921875
	$\frac{1}{65536}$ = .0000152587890625	$\frac{1}{131072}$ = .00000762939453125	$\frac{23}{32}$ = .1796875	$\frac{23}{64}$ = .139453125	$\frac{23}{128}$ = .069921875
	$\frac{1}{131072}$ = .00000762939453125	$\frac{1}{262144}$ = .000003814697265625	$\frac{24}{32}$ = .1875	$\frac{24}{64}$ = .1453125	$\frac{24}{128}$ = .0728515625
	$\frac{1}{262144}$ = .000003814697265625	$\frac{1}{524288}$ = .0000019073486328125	$\frac{25}{32}$ = .1953125	$\frac{25}{64}$ = .151171875	$\frac{25}{128}$ = .07578125
	$\frac{1}{524288}$ = .0000019073486328125	$\frac{1}{1048576}$ = .00000095367431640625	$\frac{26}{32}$ = .203125	$\frac{26}{64}$ = .15703125	$\frac{26}{128}$ = .0787109375
	$\frac{1}{1048576}$ = .00000095367431640625	$\frac{1}{2097152}$ = .000000476837158203125	$\frac{27}{32}$ = .2109375	$\frac{27}{64}$ = .162890625	$\frac{27}{128}$ = .081640625
	$\frac{1}{2097152}$ = .000000476837158203125	$\frac{1}{4194304}$ = .0000002384185791015625	$\frac{28}{32}$ = .21875	$\frac{28}{64}$ = .16875	$\frac{28}{128}$ = .0845703125
	$\frac{1}{4194304}$ = .0000002384185791015625	$\frac{1}{8388608}$ = .00000011920928955078125	$\frac{29}{32}$ = .2265625	$\frac{29}{64}$ = .174609375	$\frac{29}{128}$ = .0875
	$\frac{1}{8388608}$ = .00000011920928955078125	$\frac{1}{16777216}$ = .000000059604644775390625	$\frac{30}{32}$ = .234375	$\frac{30}{64}$ = .18046875	$\frac{30}{128}$ = .0904296875
	$\frac{1}{16777216}$ = .000000059604644775390625	$\frac{1}{33554432}$ = .0000000298023223876953125		$\frac{31}{64}$ = .186328125	$\frac{31}{128}$ = .093359375
	$\frac{1}{33554432}$ = .0000000298023223876953125	$\frac{1}{67108864}$ = .00000001490116119384765625		$\frac{32}{64}$ = .1921875	$\frac{32}{128}$ = .0962890625
	$\frac{1}{67108864}$ = .00000001490116119384765625	$\frac{1}{134217728}$ = .000000007450580596923828125		$\frac{33}{64}$ = .198046875	$\frac{33}{128}$ = .09921875
	$\frac{1}{134217728}$ = .000000007450580596923828125	$\frac{1}{268435456}$ = .0000000037252902984619140625		$\frac{34}{64}$ = .20390625	$\frac{34}{128}$ = .1021484375
	$\frac{1}{268435456}$ = .0000000037252902984619140625	$\frac{1}{536870912}$ = .00000000186264514923095703125		$\frac{35}{64}$ = .209765625	$\frac{35}{128}$ = .105078125
	$\frac{1}{536870912}$ = .00000000186264514923095703125	$\frac{1}{1073741824}$ = .000000000931322574615478515625		$\frac{36}{64}$ = .215625	$\frac{36}{128}$ = .1080078125
	$\frac{1}{1073741824}$ = .000000000931322574615478515625	$\frac{1}{2147483648}$ = .0000000004656612873077392578125		$\frac{37}{64}$ = .221484375	$\frac{37}{128}$ = .1109375
	$\frac{1}{2147483648}$ = .0000000004656612873077392578125	$\frac{1}{4294967296}$ = .00000000023283064365386962890625		$\frac{38}{64}$ = .22734375	$\frac{38}{128}$ = .1138671875
	$\frac{1}{4294967296}$ = .00000000023283064365386962890625	$\frac{1}{8589934592}$ = .000000000116415321826934814453125		$\frac{39}{64}$ = .233203125	$\frac{39}{128}$ = .116796875
	$\frac{1}{8589934592}$ = .000000000116415321826934814453125	$\frac{1}{17179869184}$ = .0000000000582076609134674072265625		$\frac{40}{64}$ = .2390625	$\frac{40}{128}$ = .1197265625
	$\frac{1}{17179869184}$ = .0000000000582076609134674072265625	$\frac{1}{34359738368}$ = .00000000002910383045673370361328125		$\frac{41}{64}$ = .244921875	$\frac{41}{128}$ = .12265625
	$\frac{1}{34359738368}$ = .00000000002910383045673370361328125	$\frac{1}{68719476736}$ = .000000000014551915228366851806640625		$\frac{42}{64}$ = .25078125	$\frac{42}{128}$ = .1255859375
	$\frac{1}{68719476736}$ = .000000000014551915228366851806640625	$\frac{1}{137438953472}$ = .0000000000072759576141834259033203125		$\frac{43}{64}$ = .256640625	$\frac{43}{128}$ = .128515625
	$\frac{1}{137438953472}$ = .0000000000072759576141834259033203125	$\frac{1}{274877906944}$ = .00000000000363797880709171295166015625		$\frac{44}{64}$ = .2625	$\frac{44}{128}$ = .1314453125
	$\frac{1}{274877906944}$ = .00000000000363797880709171295166015625	$\frac{1}{549755813888}$ = .000000000001818989403545856475830078125		$\frac{45}{64}$ = .268359375	$\frac{45}{128}$ = .134375
	$\frac{1}{549755813888}$ = .000000000001818989403545856475830078125	$\frac{1}{1099511627776}$ = .0000000000009094947017729282379150390625		$\frac{46}{64}$ = .27421875	$\frac{46}{128}$ = .1373046875
	$\frac{1}{1099511627776}$ = .0000000000009094947017729282379150390625	$\frac{1}{2199023255552}$ = .00000000000045474735088646191795751953125		$\frac{47}{64}$ = .280078125	$\frac{47}{128}$ = .140234375
	$\frac{1}{2199023255552}$ = .00000000000045474735088646191795751953125	$\frac{1}{4398046511104}$ = .000000000000227373675443230958978759765625		$\frac{48}{64}$ = .2859375	$\frac{48}{128}$ = .1431640625
	$\frac{1}{4398046511104}$ = .000000000000227373675443230958978759765625	$\frac{1}{8796093022208}$ = .0000000000001136868377216154794893798828125		$\frac{49}{64}$ = .291796875	$\frac{49}{128}$ = .14609375
	$\frac{1}{8796093022208}$ = .0000000000001136868377216154794893798828125	$\frac{1}{17592186044416}$ = .00000000000005684341886080773974468994140625		$\frac{50}{64}$ = .29765625	$\frac{50}{128}$ = .1490234375
	$\frac{1}{17592186044416}$ = .00000000000005684341886080773974468994140625	$\frac{1}{35184372088832}$ = .000000000000028421709430403869872344970703125		$\frac{51}{64}$ = .303515625	$\frac{51}{128}$ = .151953125
	$\frac{1}{35184372088832}$ = .000000000000028421709430403869872344970703125	$\frac{1}{70368744177664}$ = .0000000000000142108547152019349361724853515625		$\frac{52}{64}$ = .309375	$\frac{52}{128}$ = .1548828125
	$\frac{1}{70368744177664}$ = .0000000000000142108547152019349361724853515625	$\frac{1}{140737488355328}$ = .000000000000007105427357600967468086242678125		$\frac{53}{64}$ = .315234375	$\frac{53}{128}$ = .1578125
	$\frac{1}{140737488355328}$ = .000000000000007105427357600967468086242678125	$\frac{1}{281474976710656}$ = .00000000000000355271367880048373404312134375		$\frac{54}{64}$ = .32109375	$\frac{54}{128}$ = .1607421875
	$\frac{1}{281474976710656}$ = .00000000000000355271367880048373404312134375	$\frac{1}{562949953421312}$ = .000000000000001776356839400241867021560671875		$\frac{55}{64}$ = .326953125	$\frac{55}{128}$ = .163671875
	$\frac{1}{562949953421312}$ = .000000000000001776356839400241867021560671875	$\frac{1}{1125899906842624}$ = .000000000000000888178419700120933510780339375		$\frac{56}{64}$ = .3328125	$\frac{56}{128}$ = .1666015625
	$\frac{1}{1125899906842624}$ = .000000000000000888178419700120933510780339375	$\frac{1}{2251799813685248}$ = .0000000000000004440892098500604667553901696875		$\frac{57}{64}$ = .338671875	$\frac{57}{128}$ = .16953125
	$\frac{1}{2251799813685248}$ = .0000000000000004440892098500604667553901696875	$\frac{1}{4503599627370496}$ = .00000000000000022204460492503023337769508484375		$\frac{58}{64}$ = .34453125	$\frac{58}{128}$ = .1724609375
	$\frac{1}{4503599627370496}$ = .00000000000000022204460492503023337769508484375	$\frac{1}{9007199254740992}$ = .000000000000000111022302462515116688847542421875		$\frac{59}{64}$ = .350390625	$\$

USEFUL INFORMATION

TAP DRILLS

FOR MACHINE AND HAND TAPS

These tables give the diameter of Drills in thousandths of an inch for holes to be tapped, and is an allowance above actual bottom diameter size of thread, of from .015 of an inch for a 1/4-inch Tap, to .062 for a 2-inch Tap, for V thread; and of .004 of an inch for a 1/4-inch Tap, to .010 for a 2-inch Tap for U. S. Standard thread; and .019 of an inch for a No. 2 to .040 for a No. 30 Screw Gauge Tap.

Diameter Tap Inches	Number Threads to Inch	Drill for V Thread	Diameter Tap Inches	Drill for U. S. Standard Thread	Diameter Tap Inches	Number Threads to Inch	Drill for V Thread	Diameter Tap Inches	Drill for U. S. Standard Thread
1/4	20, 24, 32	3/16, 13/64, 13/64	1/4	3/16	3/8	9, 10, 12	49/64, 25/32, 13/16	1	1 1/2
5/16	20, 24, 32	7/32, 15/64, 17/64	5/16	1/4	1	8, 12	27/32, 29/32, 15/16	1 1/8	1 1/4
3/8	18, 20, 24	9/32, 19/64, 19/64	3/8	19/64	1 1/8	8, 12	13/8, 15/8, 15/8	1 1/4	1 1/2
7/16	18, 20, 24	11/32, 23/64, 23/64	7/16	23/64	1 1/4	7, 8	13/4, 15/4, 15/4	1 1/2	1 3/4
1/2	14, 16, 18	13/32, 27/64, 27/64	1/2	13/32	1 1/2	7, 12	13/2, 15/2, 15/2	1 3/8	1 1/2
5/8	14, 16, 18	15/32, 31/64, 31/64	5/8	31/64	1 3/4	6	13/4, 15/4, 15/4	1 1/2	1 1/2
3/4	12, 14, 16	17/32, 35/64, 35/64	3/4	35/64	1 7/8	6	13/2, 15/2, 15/2	1 1/2	1 1/2
7/8	12, 14, 16	19/32, 39/64, 39/64	7/8	39/64	2	5	13/2, 15/2, 15/2	1 1/2	1 1/2
1	12, 13, 14	21/32, 43/64, 43/64	1	43/64		5	13/2, 15/2, 15/2	1 1/2	1 1/2
1 1/8	12, 13, 14	23/32, 47/64, 47/64	1 1/8	47/64		5	13/2, 15/2, 15/2	1 1/2	1 1/2
1 1/4	12, 14, 27	25/32, 51/64, 51/64	1 1/4	51/64		5	13/2, 15/2, 15/2	1 1/2	1 1/2
1 1/2	12, 14, 27	27/32, 55/64, 55/64	1 1/2	55/64		5	13/2, 15/2, 15/2	1 1/2	1 1/2
1 3/4	10, 11, 12	29/32, 59/64, 59/64	1 3/4	59/64		5	13/2, 15/2, 15/2	1 1/2	1 1/2
2	10, 11, 12	31/32, 63/64, 63/64	2	63/64		5	13/2, 15/2, 15/2	1 1/2	1 1/2
2 1/8	10, 12, 20	33/32, 67/64, 67/64	2 1/8	67/64		5	13/2, 15/2, 15/2	1 1/2	1 1/2
2 1/4	10, 12, 20	35/32, 71/64, 71/64	2 1/4	71/64		5	13/2, 15/2, 15/2	1 1/2	1 1/2
2 1/2	9, 10, 12	37/32, 75/64, 75/64	2 1/2	75/64		5	13/2, 15/2, 15/2	1 1/2	1 1/2

FOR MACHINE SCREW TAPS

Size of Tap Inches	Size of Drill Inches	Size of Tap Inches	Size of Drill Inches	Size of Tap Inches	Size of Drill Inches	Size of Tap Inches	Size of Drill Inches	Size of Tap Inches	Size of Drill Inches	Size of Tap Inches	Size of Drill Inches
2x48	.070	6x30	.101	9x32	.147	13x24	.180	17x20	.213	24x16	.295
2x56	.073	6x32	.104	10x24	.147	14x18	.177	18x16	.221	24x18	.302
2x64	.076	6x36	.106	10x30	.152	14x20	.180	18x18	.221	26x14	.316
3x40	.073	6x40	.110	10x32	.152	14x24	.193	18x20	.228	26x16	.323
3x48	.078	7x30	.113	11x24	.159	15x18	.189	19x16	.228	28x14	.339
3x56	.082	7x32	.116	11x28	.161	15x20	.193	19x18	.238	28x16	.348
4x32	.081	7x40	.128	11x30	.166	15x22	.199	19x20	.242	30x14	.368
4x36	.086	8x30	.120	12x20	.152	15x24	.201	20x16	.242	30x16	.377
4x40	.089	8x32	.128	12x22	.161	16x16	.189	20x18	.250	.....	.....
5x30	.089	8x36	.140	12x24	.166	16x18	.199	20x20	.257	.....	.....
5x32	.093	9x24	.128	12x32	.187	16x20	.201	22x16	.266	.....	.....
5x36	.096	9x28	.140	13x20	.173	17x16	.199	22x18	.277	.....	.....
5x40	.101	9x30	.140	13x22	.173	17x18	.209	24x14	.290	.....	.....

FOR PIPE TAPS

The sizes of Twist Drills to be used in boring holes to be reamed with Pipe Reamer, and threaded with Pipe Tap, are as follows:

Size Inches	Number of Threads to Inch	Diameter Drill Inches	Size Inches	Number of Threads to Inch	Diameter Drill Inches
1/8	27	11/32	1 1/2	11 1/2	1 3/4
1/4	18	11/16	2	11 1/2	2 1/4
3/8	18	1 1/8	2 1/2	8	2 3/4
1/2	14	1 1/4	3	8	3 1/4
3/4	14	1 1/2	3 1/2	8	3 3/4
1	11 1/2	1 5/8	4	8	4 1/4
1 1/4	11 1/2	1 3/4	.....	.....	.....

USEFUL INFORMATION

TAP DRILLS
FOR A. S. M. E. STANDARD
MACHINE SCREW TAPS

The diameter given for each hole to be tapped allows for a practical clearance at the root of the thread of the screw and will not impose undue strain upon the tap in service.

Size of Tap	No. of Threads	Size of Drill	Size of Tap	No. of Threads	Size of Drill	Size of Tap	No. of Threads	Size of Drill	Size of Tap	No. of Threads	Size of Drill
0	80	.0465	5	44	.0995	9	32	.1405	20	18	.257
1	64	.055	6	32	.1015	10	24	.140	20	20	.261
1	72	.0595	6	36	.1065	10	30	.152	22	16	.272
2	56	.0670	6	40	.110	10	32	.154	22	18	.281
2	64	.070	7	30	.113	12	24	.166	24	16	.295
3	48	.076	7	32	.116	12	28	.173	24	18	.302
3	56	.0785	7	36	.120	14	20	.182	26	14	.316
4	36	.080	8	30	.1285	14	24	.1935	26	16	.323
4	40	.082	8	32	.1285	16	20	.209	28	14	.339
4	48	.089	8	36	.136	16	22	.213	28	16	.348
5	36	.0935	9	24	.1285	18	18	.228	30	14	.368
5	40	.098	9	30	.136	18	20	.234	30	16	.377

LETTER SIZES OF DRILLS

Diameter Inches	Decimals of 1 Inch	Diameter Inches	Decimals of 1 Inch
A $\frac{1}{16}$	.234	N $\frac{1}{8}$	.302
B $\frac{1}{8}$	.238	O $\frac{1}{4}$	.316
C $\frac{3}{16}$	.242	P $\frac{1}{4}$	.323
D $\frac{1}{4}$	.246	Q $\frac{3}{8}$	.332
E $\frac{5}{16}$	.250	R $\frac{1}{2}$	.339
F $\frac{3}{8}$	.257	S $\frac{5}{8}$	.348
G $\frac{7}{16}$	.261	T $\frac{3}{4}$	.358
H $\frac{1}{2}$	.266	U $\frac{7}{8}$	.368
I $\frac{9}{16}$	.272	V $\frac{1}{2}$	.377
J $\frac{5}{8}$	.277	W $\frac{1}{2}$	.386
K $\frac{3}{4}$	.281	X $\frac{1}{2}$	.397
L $\frac{7}{8}$	.290	Y $\frac{1}{2}$	.404
M $\frac{1}{2}$	.295	Z $\frac{1}{2}$	.413

LUBRICANTS FOR CUTTING TOOLS

Material	Turning	Chucking	Drilling Milling	Reaming	Tapping
Tool Steel	Dry or Oil	Oil or Soda Water	Oil	Lard Oil	Oil
Soft Steel	Dry or Soda Water	Soda Water	Oil or Soda Water	Lard Oil	Oil
Wrought Iron	Dry or Soda Water	Soda Water	Oil or Soda Water	Lard Oil	Oil
Cast Iron	Dry	Dry	Dry	Dry	Oil
Brass	Dry	Dry	Dry	Dry	Oil
Copper	Dry	Oil	Oil	Mixture	Oil
Babbitt	Dry	Dry	Dry	Dry	Oil
Glass			Turpen-tine	Kerosene	

THERMOMETERS

Boiling Point. Freezing Point
 Fahrenheit = 212 degrees. Fahrenheit = 32 degrees.
 Centigrade = 100 degrees. Centigrade = 0 degrees.
 Reaumur = 80 degrees. Reaumur = 0 degrees.
 Let. F = No. of degrees Fahrenheit.
 Let. C = No. of degrees Centigrade.
 Let. R = No. of degrees Reaumur.

Then to convert

$$\frac{5 (F - 32)}{9} = C$$

$$\frac{4 (F - 32)}{9} = R$$

$$\frac{9 C}{5} + 32 = F$$

$$\frac{9 R}{4} + 32 = F$$

Mixture is $\frac{1}{3}$ Crude Petroleum, $\frac{2}{3}$ Lard Oil. Oil is Lard.
 When two lubricants are mentioned the first is preferable.

MEASURES OF VOLUME

1728 cubic inches = 1 cubic foot.
 Cubic inches $\times 0.00058$ = cubic feet.
 27 cubic feet = 1 cubic yard.
 Cubic feet $\times 0.03704$ = cubic yards.
 128 cubic feet = 1 cord of wood.
 2150.42 cubic inches = 1 bushel.
 1 cubic foot = about $\frac{7}{8}$ bushel.
 231 cubic inches = 1 gallon (U. S.).

Gallons (U. S.) in cylindrical tank = square of diameter in inches \times length in inches $\times 0.0034$.

USEFUL INFORMATION

RULES RELATIVE TO THE CIRCLE, ETC.

- To Find Circumference—
 Multiply diameter by 3.1416
 Or divide " " 0.3183
 To Find Diameter—
 Multiply circumference by 0.3183
 Or divide " " 3.1416
 To Find Radius—
 Multiply circumference by 0.15915
 Or divide " " 6.28318
 To Find Side of an Inscribed Square—
 Multiply diameter by 0.7071
 Or multiply circumference by 0.2251
 " divide " " 4.4428
 To Find Side of an Equal Square—
 Multiply diameter by 0.8862
 Or divide " " 1.1284
 " multiply circumference by 0.2821
 " divide " " 3.545

SQUARE—

- A side multiplied by 1.4142 equals diameter of its circumscribing circle.
 A side multiplied by 4.443 equals circumference of its circumscribing circle.
 A side multiplied by 1.128 equals diameter of an equal circle.
 A side multiplied by 3.457 equals circumference of an equal circle.
 Square inches multiplied by 1.273 equals circle inches of an equal circle.
 To Find the Area of a Circle—
 Multiply circumference by one-quarter of the diameter.
 Or multiply the square of diameter by 0.7854
 " " " " circumference " 0.7958
 " " " " $\frac{1}{2}$ diameter " 3.1416
 To Find the Surface of a Sphere or Globe—
 Multiply the diameter by the circumference.
 Or " " square of diameter by 3.1416
 " " four times the square of radius " 3.1416

METRIC CONVERSION TABLE

Millimeters	X	.03937	=	Inches
"	=	25.400	X	"
Meters	X	3.2809	=	Feet
"	=	.3048	X	"
Kilometers	X	.621377	=	Miles
"	=	1.6093	X	"
Square centimeters	X	.15500	=	Square inches
" "	=	6.4515	X	" "
Square meters	X	10.76410	=	Square feet
" "	=	.09290	=	" "
Square kilometers	X	247.1098	=	Acres
" "	=	.00405	X	"
Hectares	X	2.471	=	"
"	=	.4047	X	"
Cubic centimeters	X	.061025	=	Cubic inches
" "	=	16.3866	X	"
Cubic meters	X	35.3156	=	Cubic feet
" "	=	.02832	X	"
" "	X	1.308	=	Cubic yards
" "	=	.765	X	"
Liters	X	61.023	=	Cubic inches
"	=	.01639	X	"
"	X	.26418	=	U. S. Gallons
"	=	3.7854	X	"
Grams	X	15.4324	=	Grains
"	=	.0648	X	"
"	X	.03527	=	Oz., av'dupois
"	=	28.3495	X	"
Kilograms	X	2.2046	=	Pounds
"	=	.4536	X	"
Kilogram's per sq. centimeter	X	14.2231	=	Lbs. per sq. inch
"	=	.0703	X	"
Kilogram per cubic meter	X	.06243	=	Lbs. per cubic ft.
"	=	16.01890	X	"
Metric tons (1,000 kilog's)	X	1.1023	=	Tons (2,000 lbs)
"	=	.9072	X	"
Kilowatts	X	1.3405	=	Horse-powers
"	=	.746	X	"
Calories	X	3.9683	=	B. T. units
"	=	.2520	X	"
Francs	X	.193	=	Dollars
"	=	5.18	X	"

THE METRIC SYSTEM OF MEASUREMENT

MEASURES OF LENGTH

- 1 Millimeter (mm.) = 0.03937079 inch, or about $\frac{1}{25}$ inch
 10 Millimeters = 1 Centimeter (cm.) = 0.3937079 "
 10 Centimeters = 1 Decimeter (dm.) = 3.937079 "
 10 Decimeters = 1 meter (m.) =
 39.37079 inches, 3.2808992 feet, or 1.09361 yards
 10 Meters = 1 Decameter (Dm.) = 32.808992 feet
 10 Decameters = 1 Hectometer (Hm.) = 19.927817 rods
 10 Hectometers = 1 Kilometer (Km.) =
 1093.61 yards, or 0.6213824 mile
 10 Kilometers = 1 Myriameter (Mm.) = 6.213824 miles
 1 inch = 2.54 cm., 1 foot = 0.3048 m., 1 yard = 0.9144 m.,
 1 rod = 0.5029 Dm., 1 mile = 1.6093 Km.

MEASURES OF WEIGHT

- 1 Gramme (g.) = 15.4324874 gr. Troy, or 0.03215 oz. Troy, or
 0.03527398 oz. avoirdupois
 10 Grammes = 1 Decagramme (Dg.) = . . . 0.3527398 "
 10 Decagrammes = 1 Hectogramme (Hg.) =
 3.527398 "
 10 Hectogrammes = 1 Kilogramme (Kg.) = . . . 2.20462125 lbs.
 1000 Kilogrammes = 1 Tonne (T.) = 2204.62125 lbs., or 1.1023
 tons of 2000 lbs., or 0.9842 ton of 2240 lbs., or 19.68 cwts.
 1 grain = 0.0648 g., 1 oz. avoirdupois = 28.35 g., 1 lb. = 0.4536
 Kg., 1 ton 2000 lbs. = 0.9072 T., 1 ton 2240 lbs. = 1.016 T., or
 1016 Kg.

MEASURES OF CAPACITY

- 1 Liter (l.) = 1 cubic decimeter = 61.0270515 cubic in., or
 0.03531 cu. ft., or 1.0567 liquid qts., or 0.908 dry qt., or
 0.26417 Amer. gal.
 10 Liters = 1 Decaliter (Dl.) = 2.6417 gal., or 1.135 pk.
 10 Decaliters = 1 Hectoliter (Hl.) = 2.8375 bu.
 10 Hectoliters = 1 Kiloliter (Kl.) = 61027.0515 cu. in., or 28.375
 bu.
 1 cu. foot = 28.3171 l., 1 gallon, Amer. = 3.785 l., 1 gallon
 Brit. = 4.543 l.

USEFUL INFORMATION

CIRCUMFERENCES AND AREAS OF CIRCLES

Diameter, Inches	Circumference, Inches	Area, Square Inches	Diam- eter, Inches	Circumference, Inches	Area, Square Inches	Diam- eter, Inches	Circumference, Inches	Area Square Inches
1/8	.39270	.01227	11	35.55	95.033	56	175.93	2463.01
1/4	.78540	.04909	12	37.69	113.09	57	179.07	2551.76
3/8	1.1781	.11045	13	40.841	132.73	58	182.21	2642.08
1/2	1.5708	.19635	14	43.982	143.94	59	185.35	2733.97
5/8	1.9365	.30680	15	47.124	176.71	60	188.50	2827.43
3/4	2.3562	.44179	16	50.265	201.06	61	191.64	2922.47
7/8	2.7489	.60132	17	53.407	226.98	62	194.78	3019.07
1	3.141	.7854	18	56.549	254.47	63	197.92	3117.25
1/8	3.534	.9940	19	59.690	283.53	64	201.06	3216.99
1/4	3.927	1.227	20	62.832	314.16	65	204.20	3318.31
3/8	4.319	1.484						
1/2	4.712	1.767	21	65.973	346.36	66	207.34	3421.19
5/8	5.105	2.073	22	69.115	380.13	67	210.49	3525.65
3/4	5.497	2.405	23	72.257	415.48	68	213.63	3631.68
7/8	5.890	2.761	24	75.398	452.39	69	216.77	3739.28
2	6.283	3.141	25	78.540	490.87	70	219.91	3848.45
1/4	7.068	3.976	26	81.681	530.93	71	223.05	3959.19
1/2	7.854	4.908	27	84.823	572.56	72	226.19	4071.50
3/4	8.639	5.939	28	87.965	615.75	73	229.34	4185.39
3	9.424	7.068	29	91.106	660.52	74	232.48	4300.84
1/4	10.21	8.295	30	94.248	706.86	75	235.62	4417.86
1/2	10.99	9.621						
3/4	11.78	11.044	31	97.389	754.77	76	238.76	4536.46
4	12.56	12.566	32	100.53	804.25	77	241.90	4656.63
1/4	13.35	14.186	33	103.67	855.30	78	245.04	4778.36
1/2	14.13	15.904	34	106.81	907.92	79	248.19	4901.67
3/4	14.92	17.720	35	109.96	962.11	80	251.33	5026.55
5	15.70	19.635	36	113.10	1017.88	81	254.47	5153.
1/4	16.49	21.647	37	116.24	1075.21	82	257.61	5281.02
1/2	17.27	23.758	38	119.38	1134.11	83	260.75	5410.61
3/4	18.06	25.967	39	122.52	1194.59	84	263.89	5541.77
6	18.84	28.274	40	125.66	1256.64	85	267.04	5674.50
1/4	19.63	30.679	41	128.81	1320.25	86	270.18	5808.80
1/2	20.42	33.183	42	131.95	1385.44	87	273.32	5944.68
3/4	21.20	35.784	43	135.09	1452.20	88	276.46	6082.12
7	21.99	38.484	44	138.23	1520.53	89	279.60	6221.14
1/4	22.77	41.282	45	141.37	1590.43	90	282.74	6361.73
1/2	23.56	44.178						
3/4	24.34	47.173	46	144.51	1661.90	91	285.88	6503.88
8	25.13	50.265	47	147.65	1734.94	92	289.03	6647.61
1/4	25.91	53.456	48	150.80	1809.56	93	292.17	6792.91
1/2	26.70	56.745	49	153.94	1885.74	94	295.31	6939.78
3/4	27.48	60.132	50	157.08	1963.50	95	298.45	7088.22
9	28.27	63.617	51	160.22	2042.82	96	301.59	7238.23
1/4	29.05	67.200	52	163.36	2123.72	97	304.73	7339.81
1/2	29.84	70.882	53	166.50	2206.18	98	307.88	7542.96
3/4	30.63	74.662	54	169.65	2290.22	99	311.02	7697.69
10	31.41	78.539	55	172.79	2375.83	100	314.16	7853.98

GAS ENGINE HORSE POWER FORMULA

Horse power rating adopted by Mechanical Branch of American Licensed Automobile Manufacturers and based on 1000 feet piston speed per minute. Most stationary engines do not run faster than 400 feet piston speed.

(An engine with 6 inch stroke has 400 ft. piston speed at 400 R. P. M.)

D = Bore of cylinder.

N = Number of cylinders.

2.5 = Arbitrary Constant.

D² N

— = H. P. of four stroke cycle motor.

2.5

USEFUL INFORMATION

STEAM

FEED-WATER HEATERS

Heating the feed-water for boilers by means of the exhaust steam, which is otherwise wasted, is not thoroughly appreciated by all. Every heat unit thus returned to the boilers replaces a certain amount of coal, in addition to which the boilers are not strained by the unequal expansion engendered by feeding cold water. But in addition to these gains, a most important one lies in the matter of lack of scales forming in the boilers. It is well known that water at a boiling temperature expels the carbonic acid from soluble carbonates of lime and magnesia, transforming them into insoluble carbonates, which are then precipitated upon the adjacent surfaces. Again, if boiling is conducted at a high temperature under pressure, it results in almost complete separation and precipitation of the sulphates of lime. These comprise the scales that coat the tubes. More fuel is required to make steam through scale and iron than through the metal alone, in the following proportions, as has been demonstrated by experiments:

1/8-inch scale requires 15 per cent more fuel than normal.

1/4-inch scale requires 60 per cent more fuel than normal.

1/2-inch scale requires 150 per cent more fuel than normal.

A temperature of 320° F. is required to raise 90 pounds of steam through 1/4-inch of iron, but if there is an additional 1/2 inch of scale on the tube, a temperature of 700° F. is required, or almost a low red heat. High temperatures promote rapid oxidation of iron, and at any temperature above 600° F. it becomes granular and brittle from carbonization, resembling cast iron. Thus boilers are weakened, and explosions possible.

Seven hundred and fifty dollars per year for repairs and loss of fuel is the estimate of the American Railway Master Mechanics' Association of the United States as applying to every locomotive boiler in the Middle and Western States from bad water, and we think the same estimate about correct for stationary boilers of the same power.

By means of heaters, the water is brought to a boiling temperature within the heater, and the minerals are precipitated upon plates placed there for that purpose in open heaters, and upon the tubes of closed heaters. The plates of open heaters are easily removed, cleansed and replaced.

An injector will heat the feed-water, but it uses live steam instead of the waste exhaust steam.

In the closed type of heaters, the exhaust steam is kept from intimate contact with the feed-water by tubes, while in the open type they come into direct contact, filters being used to separate the oil and grease from the water before it returns to the feed pumps.

PERCENTAGE OF SAVING OF FUEL BY HEATING FEED-WATER (STEAM AT 60 POUNDS)

Final Temperature	Initial Temperature of Water, Degrees Fahrenheit											
	32	40	50	60	70	80	90	100	120	140	160	180
60	2.39	1.71	0.86	.....	.....	.....	.....	.....	.....	.....	.....	.....
80	4.09	3.43	2.59	1.74	0.88	.....	.....	.....	.....	.....	.....	.....
100	5.79	5.14	4.32	3.49	2.64	1.77	0.90	.....	.....	.....	.....	.....
120	7.50	6.85	6.05	5.23	4.40	3.55	2.68	1.80	.....	.....	.....	.....
140	9.20	8.57	7.77	6.97	6.15	5.32	4.47	3.61	1.84	.....	.....	.....
160	10.90	10.28	9.50	8.72	7.91	7.09	6.26	5.42	3.67	1.87	.....	.....
180	12.60	12.00	11.23	10.46	9.68	8.87	8.06	7.23	5.52	3.75	1.91	.....
200	14.30	13.71	13.00	12.20	11.43	10.65	9.85	9.03	7.36	5.62	3.82	1.96
220	16.00	15.42	14.70	14.00	13.19	12.33	11.64	10.84	9.20	7.50	5.73	3.93
240	17.79	17.30	16.42	15.69	14.96	14.20	13.43	12.65	11.05	9.37	7.64	5.90
260	19.40	18.85	18.15	17.44	16.71	15.97	15.22	14.45	11.88	11.24	9.56	7.86

COMPARATIVE SAVING OF FUEL WITH THE USE OF INJECTORS, STEAM PUMPS AND POWER PUMPS

Feeder	Without Heater		With Heater	
	Coal Used	Saving	Coal Used	Saving
Injector.....	0.985	1.5%	0.938	6.2%
Steam pump.....	1.000	0.0%	0.897	12.1%
Power pump.....	.....	.....	0.868	13.2%

USEFUL INFORMATION

STEAM

A standard Horse Power: The evaporation of 30 pounds of water per hour from a feed water temperature of 100° F. into steam at 70 pounds gauge pressure.

Each nominal horse power of boilers requires approximately one-half cubic foot of water per hour.

Steam rising from water at its boiling point (212 degrees) has a pressure equal to the atmosphere. (14.7 pounds to the square inch).

A cubic inch of water evaporated under ordinary atmospheric pressure is converted into one cubic foot of steam (approximately).

The specific gravity of steam (at atmospheric pressure) is .411, that of air at 34° Fahrenheit, and .0006 that of water at same temperature.

27.222 cubic feet of steam weigh one pound; 13.817 cubic feet of air weigh one pound.

Locomotives average a consumption of 3000 gallons of water per 100 miles run.

In calculating horse power of tubular or flue boilers, consider 10 square feet of heating surface equivalent to one nominal horse power.

The best designed boilers, well set, with good draft, and skillful firing, will evaporate from 7 to 10 pounds of water per pound of first-class coal.

To ascertain heating surface in tubular boilers multiply 2-3 the circumference of boiler by length of boiler in inches and add to it the area of all the tubes.

On one square foot of grate can be burned on an average from 10 to 12 pounds of hard coal, or 18 to 20 pounds of soft coal, per hour, with natural draft. With forced draft nearly double these amounts can be burned.

Steam engines, in economy, vary from 14 to 60 pounds of feed water, and from 1½ to 7 pounds of coal per hour, per indicated horse power.

Condensing engines require from 20 to 30 gallons of water, at an average low temperature, to condense the steam represented by every gallon of water evaporated in the boilers supplying the engines—approximately for most engines we say, from 1 to 1½ gallons condensing water per minute, per indicated horsepower.

HORSEPOWER OF AN ENGINE

a equals Area of piston in square inches.

p equals Mean pressure of steam on the piston per sq. in.

v equals Velocity of piston per minute in feet.

$$\text{The H. P. equals } \frac{a \times p \times v}{33000}$$

The mean pressure of the cylinder when cutting off at

¼ Stroke, equals boiler pressure	x.597
⅓ " " " "	x.670
⅔ " " " "	x.743
½ " " " "	x.847
⅓ " " " "	x.919
⅔ " " " "	x.937
¾ " " " "	x.966
⅞ " " " "	x.922

To find the weight of the rim of the fly wheel of an engine:

Nominal H. P. x 200

—equals weight in cwt.

The square of the velocity of the circumference in feet per second.

RULE FOR FINDING THE ACTUAL HORSE POWER OF BOILERS

First find the heating surface in square feet. Multiply this by 2½, which will give the number of pounds of steam that the boiler can produce per hour. The evaporation thus found is then to be divided by the weight of steam required by the engine that it is to be used per horse power per hour, and the quotient is the actual horse power that may reasonably be expected when the proposed boiler and engine are run together under favorable conditions.

DUTY OF STEAM ENGINES

The following are comparative figures showing the economy of high grade steam engines in actual practice:

Type of Engine	Temperature of Feed Water	Pounds of water Evaporated per lbs. of Cumberland Coal	Pounds of Steam 1 H.P. used per hour	Lbs. of Cumberland Coal per 1 H.P. per hour	Cost of 1 H.P. per hour sup- posing Coal at \$6.00 per ton
Noncondensing..	210	10.5	29	2.75	\$0.0073
Condensing.....	100	9.4	20	2.12	0.0056
Comp. jacketed..	100	9.4	17	1.81	0.0045

The effect of a good condenser and air pump should be to make available about 10 lbs. more mean effective pressure with the same terminal pressure; or to give the same mean effective pressure, with a correspondingly less terminal pressure. When the load on the engine requires 20 lbs. M. E. P. the condenser does half the work; at 30 lbs., one-third of the work; at 40 lbs., one-fourth, and so on. It is safe to assume that practically the condenser will save from one-fourth to one-third of the fuel, and it can be applied to any engine, cut off, or throttling, where a sufficient supply of water is available.

USEFUL INFORMATION

ELECTRICITY

ELECTRICAL UNITS

The electrical units are derived from the following mechanical units of the metric system:

Centimeter.—Unit of length. One thousand millionth part of a quadrant of the earth's surface.

Gramme.—Unit of weight. Weight of a cubic centimeter of water at a temperature of 4 degrees centigrade.

Second.—Unit of time. The time of one swing of a pendulum making 86,400 swings in a solar day.

The unit of area is the square centimeter. The unit of volume is the cubic centimeter.

THE ELECTRICAL UNITS ARE AS FOLLOWS:

Volt.—The unit of electromotive force. Force to send one ampere of current through one ohm of resistance.

Ohm.—Unit of resistance. The resistance offered to the passage of one ampere when impelled by one volt.

Megohm.—1,000 ohms.

Ampere.—Unit of current. The current which one volt can send through one ohm.

Coulomb.—Unit of quantity. Quantity of current, which, impelled by one volt, would pass through one ohm in one second.

Farad.—Unit of capacity. The capacity of a conductor or a condenser which will hold one coulomb under the pressure of one volt.

Microfarad (Mfd.).—One-millionth of a farad.

Watt.—Unit of power. The power to do work when one ampere passes through one ohm under the pressure of one volt.

Jule.—Unit of work. The work done by one watt in one second.

OHM'S LAW

Ohm's law is a method of expressing relationship existing between the electromotive force, current and resistance, and is practically the basis of most electrical computations. It is expressed in various forms, as follows:

$$\text{Current Flow} = \frac{\text{Electromotive Force}}{\text{Resistance}} \quad \text{or, } I = \frac{E}{R}$$

Electromotive force equals the current flow multiplied by resistance.

Electromotive Force—Current Flow x Resistance, or $E = I \times R$.

Resistance equals the Electromotive force divided by the current flow.

$$\text{Resistance} = \frac{\text{Electromotive Force}}{\text{Current Flow}} \quad \text{or, } R = \frac{E}{I}$$

$I = \text{Amperes. } E = \text{Volts. } R = \text{Ohms.}$

Electromotive force varies directly as the current and resistance.

Resistance varies directly with the electromotive force and inversely as the current.

Current varies directly with the electromotive force and inversely as the resistance.

The "Mil," whose expressed value is $\frac{\text{One}}{\text{One-thousandth}}$ (.001) of an inch, is the practical basis for determining the diam-

eters and thereby the area of all wires used as electric conductors. The diameters being given, the area is obtained by the well known rule, "the area of a circle, in circular units, is equal to the square of its diameter;" hence, the square of the diameter of a wire expressed in mils equals the area of its cross section.

$D^2 = A$, which area is expressed in Circular Mils or CM, hence $D^2 = \text{CM}$.

WIRING FORMULA

Ohm's law is practically the basis for the various formulae in general use for determining the proper size of wire to use to carry various currents. It is essential to know the amount of current expressed in amperes, the distance, and to decide upon the loss to allow in transmission; the best rule is as follows:

The cross section (CM) of the necessary wire is found by multiplying twice the distance one way (2D) by the amount of current expressed in amperes (C) and this by the resistance of one mil-foot (10.7) and dividing by the loss in transmission expressed in volts (v).

$$\text{Or, CM} = \frac{2D \times C \times 10.7}{v} \quad \text{Or, CM} = \frac{D \times C \times 21.4}{v}$$

KILOWATTS AND HORSEPOWER

0.746 KILOWATTS = 1 HORSEPOWER

Kilowatts to Horsepower				Horsepower to Kilowatts			
Kw.	Horsepower	Kw.	Horsepower	Hp.	Kilowatts	Hp.	Kilowatts
1	1.341	60	80.436	1	.746	60	44.76
2	2.681	70	93.842	2	1.492	70	52.22
3	4.022	80	107.248	3	2.238	80	59.68
4	5.363	90	120.654	4	2.984	90	67.14
5	6.703	100	134.048	5	3.730	100	74.60
6	8.044	200	268.12	6	4.476	200	149.20
7	9.384	300	402.18	7	5.222	300	223.80
8	10.725	400	536.24	8	5.968	400	298.4
9	12.065	500	670.30	9	6.714	500	373.0
10	13.406	600	804.36	10	7.460	600	447.6
20	26.812	700	938.42	20	14.920	700	522.2
30	40.218	800	1072.48	30	22.380	800	596.8
40	53.624	900	1206.54	40	29.840	900	671.4
50	67.030	1000	1340.60	50	37.300	1000	746.0

USEFUL INFORMATION

EFFICIENCIES OF AIR COMPRESSION

AT DIFFERENT ALTITUDES

Altitude in Feet	Barometric Pressure		Volumetric Efficiency of Compressor Per Cent.	Loss of Capacity Per Cent.	Decreased Power Required Per Cent.
	Inches Mercury	Lbs. per Sq. in.			
0	30.00	14.75	100	0	0.
1000	28.88	14.20	97	3	1.8
2000	27.80	13.67	93	7	3.5
3000	26.76	13.16	90	10	5.2
4000	25.76	12.67	87	13	6.9
5000	24.79	12.20	84	16	8.5
6000	23.86	11.73	81	19	10.1
7000	22.97	11.30	78	22	11.6
8000	22.11	10.87	76	24	13.1
9000	21.29	10.46	73	27	14.6
10000	20.49	10.07	70	30	16.1
11000	19.72	9.70	68	32	17.6
12000	18.98	9.34	65	35	19.1
13000	18.27	8.98	63	37	20.6
14000	17.59	8.65	60	40	22.1
15000	16.93	8.32	58	42	23.5

CUBIC FEET OF FREE AIR REQUIRED TO RUN ONE DRILL OF SIZE AND AT THE PRESSURE STATED BELOW

Gauge Pressure	Size and Cylinder Diameter of Drill												
	A35	A32 A86	B	C	D	D	D	E	F	F	G	H	H9
	2"	2¼"	2½"	2¾"	3"	3½"	3¾"	3½"	3½"	3½"	4¼"	5"	5½"
60	50	60	68	82	90	95	97	100	108	113	130	150	164
70	56	68	77	93	102	108	110	113	124	129	147	170	181
80	63	76	86	104	114	120	123	127	131	143	164	190	207
90	70	84	95	115	126	133	136	141	152	159	182	210	230
100	77	92	104	126	138	146	149	154	166	174	199	240	252

MULTIPLIERS TO DETERMINE CAPACITY OF COMPRESSOR REQUIRED TO OPERATE FROM 1 TO 70 ROCK DRILLS AT ALTITUDES COMPARED WITH SEA LEVEL

Altitude Above Sea Level	Number of Drills																		
	1	2	3	4	5	6	7	8	9	10	12	15	20	25	30	40	50	60	70
	Multipliers																		
0	1.	1.8	2.7	3.4	4.1	4.8	5.4	6.0	6.5	7.1	8.1	9.5	11.7	13.7	15.8	21.4	25.5	29.4	33.2
1000	1.03	1.85	2.78	3.5	4.22	4.94	5.56	6.18	6.69	7.3	8.34	9.78	12.05	14.1	16.3	22.0	26.26	30.3	34.2
2000	1.07	1.92	2.89	3.64	4.39	5.14	5.78	6.42	6.95	7.60	8.67	10.17	12.52	14.66	16.9	22.9	27.28	31.46	35.52
3000	1.10	1.98	2.97	3.74	4.51	5.28	5.94	6.6	7.15	7.81	8.91	10.45	12.87	15.07	17.38	23.54	28.05	32.34	36.52
4000	1.14	2.05	3.08	3.88	4.67	5.47	6.15	6.84	7.41	8.09	9.23	10.83	13.34	15.62	18.01	24.4	29.07	33.52	37.8
5000	1.17	2.10	3.16	3.98	4.8	5.62	6.32	7.02	7.61	8.31	9.48	11.12	13.69	16.03	18.49	25.04	29.84	34.4	38.84
6000	1.20	2.16	3.24	4.08	4.9	5.76	6.48	7.2	7.8	8.52	9.72	11.4	14.04	16.44	18.96	25.68	30.6	35.4	39.84
7000	1.23	2.21	3.32	4.18	5.04	5.9	6.64	7.38	7.99	8.73	9.96	11.68	14.39	16.85	19.43	26.32	31.36	36.16	40.84
8000	1.26	2.27	3.40	4.28	5.17	6.05	6.8	7.56	8.19	8.95	10.21	11.97	14.74	17.26	19.9	26.96	32.13	37.04	41.83
9000	1.29	2.32	3.48	4.39	5.29	6.19	6.96	7.74	8.38	9.16	10.45	12.26	15.09	17.67	20.38	27.6	32.9	37.92	42.83
10000	1.32	2.38	3.56	4.49	5.41	6.34	7.13	7.92	8.58	9.37	10.69	12.54	15.44	18.08	20.86	28.25	33.66	38.8	43.82
12000	1.37	2.47	3.7	4.66	5.62	6.57	7.4	8.22	8.9	9.73	11.1	13.02	16.03	18.77	21.64	29.32	34.94	40.28	45.48
15000	1.43	2.57	3.86	4.86	5.86	6.86	7.72	8.58	9.3	10.15	11.58	13.58	16.73	19.59	22.59	30.6	36.46	42.04	47.47

Example.—Required the amount of free air necessary to operate thirty 5-inch "H" drills at 9,000 feet altitude, using to operate these drills air at a gauge pressure of 80 pounds per square inch.

From Table I we find, when operating the drills at 80 pounds gauge pressure at sea level, that one 5-inch "H" drill requires 190 cubic feet of free air per minute.

From Table II we also find that the factor for 30 drills at 9,000 feet altitude is 20.38; multiplying 190 cubic feet by 20.38 gives 3,872 cubic feet free air per minute, which is the displacement of a compressor for the above outfit under average conditions, to which must be added pipe line losses, such as friction and leakage.

USEFUL INFORMATION

COMPRESSED AIR TABLES

FOR HOISTING ENGINES

The following table is intended to give an approximate idea of the volume of free air required for operating hoisting engines, the air being delivered to the engines at 60 pounds gauge pressure. There are so many variable conditions in the operation of hoisting by the hoisting engines in common use that accurate computations can only be offered when fixed data are given. In the table, the hoisting engine is assumed to actually run but one-half of the time for hoisting, while the compressor, of course, runs continuously. If the engine runs less than one-half the time, as it usually does, the volume of air required will be proportionately less, and vice versa. The table is computed for maximum loads, which also in practice may vary widely. From the intermittent character of the work of a hoisting engine the parts are able to resume their normal temperature between the hoists, and there is little probability of the annoyance of freezing up the exhaust passages.

TABLE OF THE VOLUME OF FREE AIR REQUIRED FOR OPERATING HOISTING ENGINES

Diameter of Cylinder Inches	Stroke Inches	R.P.M.	Normal Horsepower	Actual Horsepower	Weight Lifted Single Rope	Cubic Feet of Free Air Required
Single Cylinder Hoisting Engine						
5	6	200	3	5.9	600	75
5	8	160	4	6.3	1000	80
6¼	8	160	6	9.9	1500	125
7	10	125	10	12.1	2000	151
8¼	10	125	15	16.8	3000	170
8½	12	110	20	18.9	5000	238
10	12	110	25	26.2	6000	330
Double Cylinder Hoisting Engine						
5	6	200	6	11.8	1000	150
5	8	160	8	12.6	1650	160
6¼	8	160	12	19.8	2500	250
7	10	125	20	24.2	3500	302
8¼	10	125	30	33.6	6000	340
8½	12	110	40	37.8	8000	476
10	12	110	50	52.4	10000	660
12½	15	100	75	89.2	.....	1125
14	18	90	100	125.	.....	1587

FOR PUMPING PLANTS

For the convenience of engineers and others figuring on pumping plants to be operated by compressed air, we subjoin a table by which the pressure and volume of air required for any size pump can be readily ascertained. Reasonable allowances have been made for loss due to clearances in pump and friction in pipe.

Ratio of Diams.	Perpendicular Height, in Feet, to which the Water is to be Pumped															
	25	50	75	100	125	150	175	200	225	250	300	350	400	450	500	
1 to 1	13.75	27.5	41.25	55.0	68.25	82.5	96.25	110.0	.....	.....	.....	.....	.....	.....	.....	Air pressure at pump. Cubic feet of free air per gallon of water.
	0.21	0.45	0.60	0.75	0.89	1.04	1.20	1.34	.....	.....	.....	.....	.....	.....	.....
1½ to 1	12.22	18.33	24.44	30.33	36.66	42.76	48.88	55.0	61.11	73.32	85.4	97.66	.....	.....	Air pressure at pump. Cubic feet of free air per gallon of water.
	0.65	0.80	0.95	1.09	1.24	1.39	1.53	1.68	1.83	2.12	2.41	2.70	.....	.....
1¾ to 1	13.75	19.8	22.8	27.5	32.1	36.66	41.25	45.83	55.0	64.16	73.33	82.5	.....	Air pressure at pump. Cubic feet of free air per gallon of water.
	0.94	1.14	1.24	1.30	1.54	1.69	1.84	1.99	2.39	2.59	2.88	3.19	.....
2 to 1	13.75	17.19	20.63	24.06	27.5	30.94	34.38	41.25	48.13	55.0	61.88	68.75	Air pressure at pump. Cubic feet of free air per gallon of water.
	1.23	1.37	1.52	1.66	1.81	1.96	2.11	2.40	2.69	2.98	3.28	3.57	
2¼ to 1	13.75	16.5	19.25	22.0	24.75	27.5	33.0	38.5	44.0	49.5	55.0	Air pressure at pump. Cubic feet of free air per gallon of water.
	1.533	1.68	1.83	1.97	2.12	2.26	2.56	2.85	3.15	3.44	3.73	
2½ to 1	13.2	15.4	17.6	19.8	22.0	26.4	30.8	35.2	39.6	44.0	Air pressure at pump. Cubic feet of free air per gallon of water.
	1.79	1.98	2.06	2.104	2.34	2.62	2.88	3.18	3.36	3.23	

To find the amount of air and pressure required to pump a given quantity of water a given height, find the ratio of diameters between water and air cylinders, and multiply the number of gallons of water by the figure found in the column for the required lift. The result is the number of cubic feet of free air. The pressure required on the pump will be found directly above in the same column. For example: The ratio between cylinders being 2 to 1. Required to pump 100 gallons, height of lift 250 feet. We find under 250 feet, at ratio 2 to 1, the figures 2.11; $2.11 \times 100 = 2.11$ cubic feet of free air. The pressure required is 34.38 pounds.

USEFUL INFORMATION

WATER

To find the pressure in pounds per square inch of a column of water, multiply the height of the column in feet by .434. (Approximately, every foot elevation is called equal to one-half pound pressure per square inch). This allows for ordinary friction.

Doubling the diameter of a pipe increases its capacity four times.

Friction of liquids in pipes increases as the square of the velocity.

To find the area of a required pipe, the volume and velocity of water being given, Multiply the number of cubic feet of water by 144, and divide the product by the velocity in feet per minute.

To find the velocity in feet per minute necessary to discharge a given volume of water in a given time, multiply the number of cubic feet of water by 144, and divide the product by the area of the pipe in inches.

To find capacity of tank, given, dimensions of a cylinder in inches, to find its capacity in U. S. gallons: Square the diameter, multiply by the length and by .0034.

To find the diameter of a pump cylinder to remove a given quantity of water per minute (100 feet of piston being the standard of speed), divide the number of gallons by 4, then extract the square root, and the product will be the diameter in inches of the pump cylinder.

To find quantity of water elevated in one minute, running at 100 feet of piston speed per minute, square the diameter of the water cylinder in inches, and multiply by 4.

Example—Capacity of a 5 inch cylinder is desired. The square of the diameter (5 inches) is 25, which, multiplied by 4, gives 100, the number of gallons per minute (approximately).

The area of the steam piston, multiplied by the steam pressure, gives the total amount of pressure that can be exerted. The area of the water piston, multiplied by the pressure of water per square inch, gives the resistance. A margin must be made between the power and the resistance to move the pistons at the required speed, say from 20 to 40 per cent, according to speed and other conditions.

To find the capacity of a cylinder in gallons, multiply the area in inches by the length of stroke in inches, will give the total number of cubic inches; divide this amount by 231 and product is the capacity in gallons.

Water Hammer—The exact nature of the phenomenon known as "water hammer" has never been clearly defined, though its effects are only too well known to every engineer, the cause arising from an accumulation of condensed steam in the pipes or fittings. Should steam be suddenly admitted to a pipe partly filled with cold water, the latter will be set in violent motion and travel the length of the pipe in the form of waves, and will gain sufficient velocity to rupture any valve, blank flange, or other obstruction in its path. The extent of the rupture depends on the velocity of the incoming steam. For instance, if the valve controlling the entrance of the steam to a pipe partly filled with water is opened suddenly, a violent explosion is almost certain to follow, but if the valve is opened very gradually, while there may be a certain amount of noise and vibration, no serious results will occur.

WATER REQUIRED FOR STEAM POWER

The standard, as fixed by Watt, for determining the horse power of boilers, was one cubic foot of water evaporated per hour from 212 degrees for each horse power. This, at that time was the requirement of the best of engines in use.

At the present time Prof. Thurston estimates that the water required per hour per horse power, in good engines, is equal to the constant 200 divided by the square root of the pressure, and that, in the best engines, this constant is as low

as 150. This would give, for good engines, working with 64 pounds per square inch steam pressure, an evaporation of 25 pounds of water, and for the best engines, working with 100 pounds pressure, only 15 pounds per hour per horse power.

The standard, therefore, adopted by the judges of the Centennial exposition at Philadelphia of 30 pounds of water per hour, evaporated at 70 pounds pressure from 100 degrees for each horse power, is a fair one for both boilers and engines.

USEFUL INFORMATION

WATER

UNITS OF MEASUREMENT FOR POWER AND IRRIGATION

1 gallon of water equals 231 cubic inches.

1 gallon of water equals .1337 cubic foot.

1 gallon of water weighs 8.35 pounds

1 cubic foot of water equals 7.48 gallons.

1 cubic foot of water equals, per minute, $\frac{2}{3}$ miner's inch.

1 cubic foot of water weighs 62.5 pounds.

1 miner's inch equals $1\frac{1}{2}$ cubic feet per minute.1 miner's inch equals $11\frac{1}{4}$ gallons per minute.

1 miner's inch weighs 93.7 pounds.

Pounds pressure per square inch equals head in feet $\times .434$.Head in feet equals pressure in pounds $\times 2.304$.

To find horse-power required to elevate water:

Multiply weight of water raised per minute in pounds by vertical height in feet, and divide by 33,000. This gives the theoretical horse-power. The actual horse-power required will be twenty-five to thirty-five per cent greater, depending upon frictional conditions and the efficiency of the pump. To find horse-power developed from a stream of water:

First, find the volume of the water available in cubic feet or gallons per minute. From the volume, ascertain the weight in pounds, multiply this by the vertical fall in feet and divide by 33,000. The result is the theoretical horse-power. The actual horse-power which can be obtained will be fifteen to twenty-five per cent less than this, depending upon the frictional loss and efficiency of the water-wheel.

TABLE OF THEORETICAL HORSE-POWER TO LIFT WATER TO DIFFERENT HEIGHTS

Gal. per Min.	Height in Feet													
	5	10	15	20	25	30	35	40	45	50	60	75	90	100
5	.006	.012	.019	.025	.031	.037	.044	.05	.06	.06	.07	.09	.11	.12
10	.012	.025	.037	.050	.062	.075	.087	.10	.11	.12	.15	.19	.22	.25
15	.019	.037	.056	.075	.094	.112	.131	.15	.17	.19	.22	.28	.34	.37
20	.025	.050	.075	.100	.125	.150	.175	.20	.22	.25	.30	.37	.45	.50
25	.031	.062	.093	.125	.156	.187	.219	.25	.28	.31	.37	.47	.56	.62
30	.037	.075	.112	.150	.187	.225	.262	.30	.34	.37	.45	.56	.67	.75
35	.043	.087	.131	.175	.219	.262	.306	.35	.39	.44	.52	.66	.79	.87
40	.050	.100	.150	.200	.250	.300	.350	.40	.45	.50	.60	.75	.90	1.00
45	.056	.112	.168	.225	.281	.337	.394	.45	.51	.56	.67	.84	1.01	1.12
50	.062	.125	.187	.250	.312	.375	.437	.50	.56	.62	.75	.94	1.12	1.25
60	.075	.150	.225	.300	.375	.450	.525	.60	.67	.75	.90	1.12	1.35	1.50
75	.093	.187	.281	.375	.469	.562	.656	.75	.84	.94	1.12	1.40	1.69	1.87
90	.112	.225	.337	.450	.562	.675	.787	.90	1.01	1.12	1.35	1.68	2.02	2.25
100	.125	.250	.375	.500	.625	.750	.875	1.00	1.12	1.25	1.50	1.87	2.25	2.50
125	.156	.312	.469	.625	.781	.937	1.094	1.25	1.41	1.56	1.87	2.34	2.81	3.12
150	.187	.375	.562	.750	.937	1.125	1.312	1.50	1.69	1.87	2.25	2.81	3.37	3.75
175	.219	.437	.656	.875	1.093	1.312	1.531	1.75	1.97	2.19	2.62	3.28	3.94	4.37
200	.250	.500	.750	1.000	1.250	1.500	1.750	2.00	2.25	2.50	3.00	3.75	4.50	5.00
250	.312	.625	.937	1.250	1.562	1.875	2.187	2.50	2.81	3.12	3.75	4.69	5.62	6.25
300	.375	.750	1.125	1.500	1.875	2.250	2.625	3.00	3.37	3.75	4.50	5.62	6.75	7.50
350	.437	.875	1.312	1.750	2.187	2.625	3.062	3.50	3.94	4.37	5.25	6.56	7.87	8.75
400	.500	1.000	1.500	2.000	2.500	3.000	3.500	4.00	4.50	5.00	6.00	7.50	9.00	10.00
500	.625	1.250	1.875	2.500	3.125	3.750	4.375	5.00	5.62	6.25	7.50	9.37	11.25	12.50

Horse-power theoretically required for pumping water equals the gallons per minute multiplied by the head in feet, and divided by 4,000. For power recommended, divide by 2,000 instead of 4,000.

IRRIGATION TABLE

Giving capacity in gallons per hour, power required per foot lift, and irrigation acreage.

Gallons, Per Hour	Approximate Horse power Required, per Foot Lift	Number of Acres that will be Covered One inch Deep in Ten Hours	Gallons, per Hour	Approximate Horse power Required, Per Foot Lift	Number of Acres that will be Covered One Inch Deep in Ten Hours
500	.004	.18	6,000	.04	2.2
1,000	.007	.37	7,000	.047	2.5
1,500	.01	.55	8,000	.054	3.
2,000	.014	.74	9,000	.06	3.3
2,500	.017	.92	10,000	.067	3.7
3,000	.02	1.11	15,000	.1	5.5
3,500	.024	1.28	20,000	.134	7.4
4,000	.027	1.48	25,000	.167	9.2
4,500	.03	1.66	30,000	.2	11.1
5,000	.034	1.8	.....	.....	....

NOTE.—An allowance of fifty per cent for friction is made in the horsepower given above. One acre requires from 3 to 12 gallons of water per minute for irrigation, depending upon soil and climatic conditions.

USEFUL INFORMATION

WATER

SAFE PRESSURES FOR WROUGHT PIPE

Standard wrought pipe should stand the pressures per square inch given in the table below. It is tested at the mills to a pressure of 600 pounds per square inch, and sometimes to even 1,500 pounds for the smaller sizes.

Size, inches.....	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{3}{4}$	1	$1\frac{1}{4}$	$1\frac{1}{2}$	2	$2\frac{1}{2}$	3	4	5	6	7	8	9	10	12
Pressure, lbs....	1,500	1,500	1,500	1,500	1,200	1,200	1,000	1,000	900	800	600	600	600	500	500	500	500

SAFE PRESSURES FOR CAST-IRON PIPE

In pounds, per square inch.

Thickness, Inches	4	6	8	10	12	14	16	18	20	22	24	27	30	33	36	42	48
$\frac{7}{16}$	112	49	18	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
$\frac{1}{2}$	224	124	74	44	24	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
$\frac{9}{16}$	336	199	130	89	62	42	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
$\frac{5}{8}$	.....	274	186	132	99	74	56	41	.....	.....	.....	.....	.....	.....	.....	.....	.....
$\frac{3}{4}$	.....	.....	.....	177	137	106	84	66	51	40	30	19	.....	.....	.....	.....	.....
$\frac{7}{8}$	.....	.....	.....	.....	174	138	112	91	74	60	49	36	24	.....	.....	.....	.....
$1\frac{1}{8}$	.....	.....	.....	.....	212	170	140	116	96	80	68	52	39	.....	.....	.....	.....
$1\frac{1}{4}$	.....	.....	.....	.....	249	202	168	141	119	101	86	69	54	24	32	.....	.....
$1\frac{3}{8}$	.....	.....	.....	.....	.....	234	196	166	141	121	105	85	69	55	44	.....	.....
$1\frac{1}{2}$	.....	.....	.....	.....	.....	266	224	191	164	142	124	102	84	69	57	38	24
$1\frac{3}{4}$	.....	.....	.....	.....	.....	.....	.....	216	209	182	161	135	114	96	82	59	43
$1\frac{7}{8}$	.....	.....	.....	.....	.....	.....	.....	.....	256	224	199	165	144	124	107	81	62
$1\frac{5}{8}$	.....	.....	.....	.....	.....	.....	.....	.....	.....	237	202	174	151	132	103	81	.....
$1\frac{1}{2}$	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	236	204	178	157	124	99	.....

TABLE GIVING VELOCITY OF FLOW OF WATER

In feet per minute, through pipes of various sizes, for varying quantities of flow.

Gallons per Minute	Size Pipe, Inches							
	$\frac{3}{4}$	1	$1\frac{1}{4}$	$1\frac{1}{2}$	2	$2\frac{1}{2}$	3	4
5	218	122½	78½	54½	30½	19½	13½	7½
10	436	245	157	109	61	38	27	15½
15	653	367½	235½	163½	91½	58½	40½	23
20	872	490	314	218	122	78	54	30½
25	1090	612½	392½	272½	152½	97½	67½	38½
30	.....	735	451	327	183	117	81	46
35	.....	857½	549½	381½	213½	136½	94½	53½
40	.....	980	628	436	244	156	108	61½
45	.....	1102½	706½	490½	274½	175½	121½	69
50	.....	.....	785	545	305	195	135	76½
75	.....	.....	1177½	817½	457½	292½	202½	115
100	.....	.....	.....	1090	610	380	270	153½
125	.....	.....	.....	.....	762½	487½	337½	191½
150	.....	.....	.....	.....	915	585	405	230
175	.....	.....	.....	.....	1067½	682½	472½	268½
200	.....	.....	.....	.....	1220	780	540	306½

PRESSURE REQUIRED FOR FIRE STREAMS, USING RUBBER HOSE, AND ONE-INCH SMOOTH NOZZLE

Effective Pressure at Nozzle	Gallons Discharged per min.	Horizontal Distance of Jet	Vertical Distance of Jet	Pressure Required at Hydrant to Give Effective Pressure at Nozzle with Different Length of Hose							
				100 Feet	200 Feet	300 Feet	400 Feet	500 Feet	600 Feet	700 Feet	800 Feet
10	77	49	22	14	18	22	26	30	34	39	43
20	110	70	43	26	33	39	45	52	58	64	71
30	134	90	62	39	47	56	64	73	81	90	98
40	155	109	79	51	62	72	83	94	105	116	126
50	173	126	94	63	76	89	102	115	129	142	155
60	189	142	108	75	91	106	122	137	152	167	183
70	205	156	121	88	106	123	141	159	177	195	212
80	219	168	131	100	120	140	161	181	201	221	241
90	232	178	140	112	135	157	180	202	224	247	270
100	245	186	148	125	150	175	199	224	249	274	303

USEFUL INFORMATION

WATER

FRICTION OF WATER IN SMOOTH PIPES WHEN DISCHARGING VARIOUS QUANTITIES OF WATER IN GALLONS PER MINUTE

Friction Head in Feet	Inside Diameter of Pipe, in Inches																	
	1	1½	2	2½	3	4	5	6	7	8	9	10	11	12	15	18	20	24
1 in 1,000..	.9	2.5	5	9	15	32	57	92	139	195	265	348	445	557	991	1,581	2,100	3,340
2 in 1,000..	1.3	3.7	8	14	23	48	86	139	207	292	395	518	662	828	1,567	2,341	3,100	4,970
3 in 1,000..	1.6	4.8	10	18	29	61	110	175	261	367	497	652	832	1,036	1,841	2,934	3,930	6,200
4 in 1,000..	2.0	5.7	12	22	35	72	128	206	307	432	585	766	977	1,221	2,158	3,438	4,600	7,300
5 in 1,000..	2.3	6.7	14	24	38	82	146	234	347	490	662	870	1,106	1,381	2,445	3,887	5,200	8,270
6 in 1,000..	2.5	7.3	15	27	44	91	162	260	385	542	732	959	1,220	1,527	2,598	4,282	5,750	9,200
7 in 1,000..	2.8	8.0	16	29	48	100	177	282	418	591	798	1,041	1,332	1,663	2,936	4,671	6,250	10,000
8 in 1,000..	3.0	8.6	17	32	51	107	191	305	452	636	859	1,123	1,434	1,790	3,158	5,024	6,750	10,800
9 in 1,000..	3.3	9.2	18	34	55	115	203	325	480	678	916	1,198	1,528	1,902	3,367	5,355	7,180	11,600
1 in 100....	3.4	9.8	20	36	58	122	216	346	510	718	971	1,270	1,622	2,021	3,566	5,670	7,600	12,100
2 in 100....	5.1	14.6	30	54	86	180	317	505	722	1,050	1,417	1,856	2,360	2,944	5,186	8,316	11,200	17,700
3 in 100....	6.5	18.4	38	67	112	223	396	630	836	1,307	1,763	2,305	2,935	3,660	6,446	10,230	13,800	22,000
4 in 100....	7.6	21.5	44	79	126	262	462	735	1,087	1,527	2,058	2,590	3,425	4,270	7,497	11,923	15,600	25,700
5 in 100....	8.6	24.4	50	89	142	296	522	828	1,226	1,721	2,320	3,030	3,852	4,797	8,461	13,422	18,200	28,800
6 in 100....	9.5	27.0	56	99	157	326	576	915	1,352	1,897	2,557	3,331	4,251	5,298	9,321	14,782	20,000	32,000
7 in 100....	10.4	29.4	60	107	172	326	625	994	1,471	2,060	2,776	3,650	4,614	5,751	10,113	16,037	22,000	34,600
8 in 100....	11.3	31.5	65	115	183	381	674	1,067	1,577	2,206	2,980	3,891	4,952	6,172	10,828	17,207	23,400	37,200
9 in 100....	12.0	33.6	70	123	195	406	715	1,136	1,678	2,342	3,172	4,142	5,271	6,570	11,550	18,310	25,000	39,500
1 in 10....	12.6	35.6	75	130	207	450	757	1,198	1,776	2,490	3,355	4,380	5,576	6,946	12,210	19,355	26,500	42,000
2 in 10....	18.5	51.8	107	189	299	622	1,005	1,736	2,564	3,605	4,839	6,314	8,031	10,005	17,574	27,836	38,000	60,000
3 in 10....	23.0	64.4	133	235	372	771	1,356	2,150	3,174	4,446	5,986	7,807	9,934	12,373	21,725	34,405	47,000	74,200
4 in 10....	26.8	74.8	155	274	434	897	1,577	2,501	3,691	5,167	6,960	9,077	11,542	14,380	25,240	39,967	54,500	86,200
5 in 10....	30.2	84.6	175	308	488	1,010	1,773	2,810	4,148	5,808	7,820	10,201	12,956	16,154	28,348	44,878	61,000	97,000
6 in 10....	33.2	93.1	193	349	537	1,030	1,951	3,092	4,563	6,391	8,601	11,217	14,263	17,761	31,165	49,331	67,200	106,000
7 in 10....	36.2	101.1	209	367	580	1,205	2,115	3,352	4,946	6,925	9,320	12,155	15,455	19,238	33,761	53,301	72,700	116,000
8 in 10....	38.8	108.2	223	394	625	1,291	2,268	3,595	5,302	7,425	9,991	13,028	16,565	20,726	36,182	57,264	78,000	124,000
9 in 10....	41.3	115.5	239	419	640	1,376	2,413	3,822	5,637	7,894	10,624	13,851	17,610	21,925	38,959	60,862	83,000	132,000
10 in 10....	43.7	120.0	255	442	702	1,452	2,548	4,037	5,955	8,339	11,240	14,630	18,600	23,156	40,615	64,270	88,000	139,000

The column on the left shows the friction head in feet, enabling any one to readily estimate the friction head added by any given diameter and length of pipe, which it may be decided to connect to the pumps.

When pipe is slightly rough add 15 per cent to friction head indicated in margin. When pipe is very rough add 30 per cent to friction head indicated in margin.

FORMULA FOR FRICTION OF WATER IN PIPES

Friction head = F. Length of pipe, in feet = L. Diameter of pipe, in inches = D. Velocity of water, in feet, per second = V.

$$F = \frac{L}{1000D} \left\{ 4V^2 + 5[V-2] \right\}$$

Capacity of Pipes: A pipe one yard long holds as many pounds of water as the square of its diameter, in inches. Thus, a 6-inch pipe holds 36 pounds of water in each yard of length.

BAROMETRIC PRESSURES AT DIFFERENT ALTITUDES

With equivalent head of water and the vertical suction lift of pumps.

Altitude, Feet	Barometric Pressure, Pounds, per Square Inch	Equivalent Head of Water, Feet	Practical Suction Lift of Pump, Feet
Sea Level	14.70	33.95	25
1,320	14.02	32.38	24
2,640	13.33	30.79	23
3,960	12.66	29.24	21
5,280	12.02	27.76	20
6,600	11.42	26.38	19
7,920	10.88	25.13	18
10,560	9.88	22.82	17

USEFUL INFORMATION

WATER

MEASUREMENTS OF WATER

WEIR METHOD

When measuring brooks or small creeks, use a board long enough to reach across the stream with each end set in the bank. Cut a notch in the board deep enough to pass all the water, and long enough to reach about two-thirds across the stream. This is called a weir dam. The bottom and ends of the notch in the board should be beveled on the down-stream side, leaving the upper edge almost sharp. A stake should be driven in the bottom of stream several feet from the board, on a level with the sharp edge of notch in board. The level of the top of this stake can be easily found, when the water is beginning to spill over the notch.

When the water has reached its greatest height, a careful measurement can be made of its depth, from the top of the stake to the surface of the water. The surface of water after passing away from the board should not be nearer the notch in board than 10 to 15 inches, depending on the size of stream and quantity of water flowing.

Inch	..	1/8	1/4	3/8	1/2	5/8	3/4	7/8	In.	..	1/8	1/4	3/8	1/2	5/8	3/4	7/8
1	.40	.47	.55	.65	.74	.83	.93	1.03	13	18.87	19.14	19.42	19.69	19.97	20.24	20.52	20.80
2	1.14	1.24	1.36	1.47	1.59	1.71	1.83	1.96	14	21.09	21.37	21.65	21.94	22.22	22.51	22.79	23.08
3	2.09	2.23	2.36	2.50	2.63	2.78	2.92	3.07	15	23.38	23.67	23.97	24.26	24.56	24.86	25.16	25.46
4	3.22	3.37	3.52	3.68	3.83	3.99	4.16	4.32	16	25.76	26.06	26.36	26.66	26.97	27.27	27.58	27.89
5	4.50	4.67	4.84	5.01	5.18	5.36	5.54	5.72	17	28.20	28.51	28.82	29.14	29.45	29.76	30.08	30.39
6	5.90	6.09	6.28	6.47	6.65	6.85	7.05	7.25	18	30.70	31.02	31.34	31.66	31.98	32.31	32.63	32.96
7	7.44	7.64	7.84	8.05	8.25	8.45	8.66	8.86	19	33.29	33.61	33.94	34.27	34.60	34.94	35.27	35.60
8	9.10	9.31	9.52	9.74	9.96	10.18	10.40	10.62	20	35.94	36.27	36.60	36.94	37.28	37.62	37.96	38.31
9	10.86	11.08	11.31	11.54	11.77	12.00	12.23	12.47	21	38.65	39.00	39.34	39.69	40.04	40.39	40.73	41.09
10	12.71	12.95	13.19	13.43	13.67	13.93	14.16	14.42	22	41.43	41.78	42.13	42.49	42.84	43.20	43.56	43.92
11	14.67	14.92	15.18	15.43	15.67	15.96	16.20	16.46	23	44.28	44.64	45.00	45.38	45.71	46.08	46.43	46.81
12	16.73	16.99	17.26	17.52	17.78	18.05	18.32	18.58	24	47.18	47.55	47.91	48.28	48.65	49.02	49.39	49.76

WEIR TABLE EXPLAINED.—The weir table on this page contains figures 1, 2, 3, etc., in the first vertical column; these indicate the inches depth of water running over weir-board notches. Frequently, the depths measured represent also fractional inches, between 1 and 2, 2 and 3, and 3 and 4, and so on. The horizontal line of fractions at the top represents these fractional parts, and can be applied between any of the numbers of inches depth, from 1 to 25.

The body of the table shows the cubic feet, and the fractional parts of a cubic foot, which will pass each minute for each inch in depth, and for each fractional part of an inch by eighths for all depths from 1 to 25 inches. Each of these results is for only one-inch width of weir. To estimate, therefore, for any width of weir the result obtained for one-inch width must be multiplied by the number of inches constituting the whole horizontal length of weir. See following example:

Suppose the notch in a board is 20 inches wide, and the water over the stake measures $5\frac{1}{2}$ inches depth to the surface. Take the figure 5 in the first vertical column and follow the horizontal line of figures until the vertical column is reached containing $\frac{1}{2}$ at the top. The square where these two columns meet contains five and eighteen-hundredths (5.18) cubic feet. This is the quantity of water passing per minute for each inch in width, and $5\frac{1}{2}$ inches in depth. The supposed weir, however, is 20 inches in width; therefore, this result must be multiplied by 20, which gives one hundred and three and six-tenths (103.6) cubic feet per minute. The same method applies to any depth of water shown in table and any horizontal length of weir.

MEASUREMENT OF AN OPEN STREAM BY VELOCITY AND CROSS SECTION

Measure the depth of the water at from 6 to 12 equidistant points across the stream. Add all depths together, divide by the number of measurements, and secure the average depth in feet.

The velocity of the stream can be found by measuring off 100 feet along the bank, and noting the time required for a float to pass over this distance of 100 feet. By doing this a number of times a fair average can be found. Divide the distance by the time, and secure the velocity in feet per minute. By multiplying the feet depth by the feet velocity per minute, the flow of the stream in cubic feet per minute is secured. As the top of a stream flows somewhat faster than the bottom, it is a good plan to measure off about 120 feet when determining the velocity, calling it 100 feet for use in the final figures.

TABLE SHOWING NUMBER OF GALLONS PER MINUTE THAT WILL DISCHARGE THROUGH DIFFERENT SIZE NOZZLES
UNDER GIVEN PRESSURE

Pressure in Pounds	Diameter of Nozzle in Inches										
	1/8	1/8	1/4	1/2	3/4	1	1 1/4	1 1/2	1 3/4	2	2 1/2
20	0.52	2.09	8.4	33.4	75	134	209	300	409	534	835
30	0.64	2.56	10.2	40.9	92	164	256	368	501	654	1022
40	0.74	2.95	11.8	47.2	106	189	295	425	578	755	1180
50	0.82	3.30	13.2	52.8	119	211	330	475	646	845	1320
60	0.90	3.62	14.5	57.8	130	231	362	520	708	925	1446
70	0.97	3.91	15.6	62.5	141	250	391	562	765	999	1561
80	1.04	4.18	16.7	66.6	150	267	418	601	818	1068	1669
90	1.10	4.43	17.7	70.8	160	283	443	637	867	1133	1770
100	1.16	4.67	18.7	74.6	168	299	467	672	914	1194	1866
110	1.22	4.90	19.6	78.3	177	313	490	705	959	1253	1957
120	1.27	5.12	20.4	81.8	184	327	512	736	1001	1308	2044
130	1.33	5.32	21.3	85.1	192	341	532	766	1042	1362	2128

The above is calculated for a theoretical discharge, the actual discharge will depend upon shape and condition of nozzle.

USEFUL INFORMATION
WATER

U. S. GALLONS IN ROUND TANKS—FOR ONE FOOT IN DEPTH

Diameter of Tanks		Number U. S. Gallons	Cubic Feet and Area in Sq. Ft.	Diameter of Tanks		Number U. S. Gallons	Cubic Feet and Area in Sq. Ft.	Diameter of Tanks		Number U. S. Gallons	Cubic Feet and Area in Sq. Ft.
Feet	Inches			Feet	Inches			Feet	Inches		
1	..	5.87	.785	5	8	188.66	25.22	19	.	2120.90	283.53
1	1	6.89	.922	5	9	194.25	25.97	19	3	2177.10	291.04
1	2	8.00	1.069	5	10	199.92	26.73	19	6	2234.00	298.65
1	3	9.18	1.227	5	11	205.67	27.49	19	9	2291.70	306.35
1	4	10.44	1.396	6	.	211.51	28.27	20	.	2350.10	314.16
1	5	11.79	1.576	6	3	229.50	30.68	20	3	2409.20	322.06
1	6	13.22	1.767	6	6	248.23	33.18	20	6	2469.10	330.06
1	7	14.73	1.969	6	9	267.69	35.78	20	9	2529.60	338.16
1	8	16.32	2.182	7	.	287.88	38.48	21	.	2591.00	346.36
1	9	17.99	2.405	7	3	308.81	41.28	21	3	2653.00	354.66
1	10	19.75	2.640	7	6	330.48	44.18	21	6	2715.80	363.05
1	11	21.58	2.885	7	9	352.88	47.17	21	9	2779.30	371.54
2	..	23.50	3.142	8	.	376.01	50.27	22	.	2843.60	380.13
2	1	25.50	3.409	8	3	399.88	53.46	22	3	2908.60	388.82
2	2	27.58	3.687	8	6	424.48	56.75	22	6	2974.30	397.61
2	3	29.74	3.976	8	9	449.82	60.13	22	9	3040.80	406.49
2	4	31.99	4.276	9	.	475.89	63.62	23	.	3108.00	415.48
2	5	34.31	4.587	9	3	502.70	67.20	23	3	3175.90	424.56
2	6	36.72	4.909	9	6	530.24	70.88	23	6	3244.60	433.74
2	7	39.21	5.241	9	9	558.51	74.66	23	9	3314.00	443.01
2	8	41.78	5.585	10	.	587.52	78.54	24	.	3384.10	452.39
2	9	44.43	5.940	10	3	617.26	82.52	24	3	3455.00	461.86
2	10	47.16	6.305	10	6	640.74	86.59	24	6	3526.60	471.44
2	11	49.98	6.681	10	9	678.95	90.76	24	9	3598.90	481.11
3	..	52.28	7.069	11	.	710.90	95.03	25	.	3672.00	490.87
3	1	55.86	7.467	11	3	743.58	99.40	25	3	3745.80	500.74
3	2	58.92	7.876	11	6	776.99	103.87	25	6	3820.30	510.71
3	3	62.06	8.296	11	9	811.14	108.43	25	9	3895.60	520.77
3	4	65.28	8.727	12	.	846.03	113.10	26	.	3971.60	530.93
3	5	68.58	9.168	12	3	881.65	117.86	26	3	4048.40	541.19
3	6	71.97	9.621	12	6	918.00	122.72	26	6	4125.90	551.55
3	7	75.44	10.085	12	9	955.09	127.68	26	9	4204.10	562.00
3	8	78.99	10.559	13	.	992.91	132.73	27	.	4283.00	572.66
3	9	82.62	11.045	13	3	1031.50	137.89	27	3	4362.70	583.21
3	10	86.33	11.541	13	6	1070.80	143.14	27	6	4443.10	593.96
3	11	90.13	12.048	13	9	1110.80	148.49	27	9	4524.30	604.81
4	..	94.00	12.566	14	.	1151.50	153.94	28	.	4606.20	615.75
4	1	97.96	13.095	14	3	1193.00	159.48	28	3	4688.80	626.80
4	2	102.00	13.635	14	6	1235.30	165.13	28	6	4772.10	637.94
4	3	106.12	14.186	14	9	1278.20	170.87	28	9	4856.20	649.18
4	4	110.32	14.748	15	.	1321.90	176.71	29	.	4941.00	660.52
4	5	114.61	15.321	15	3	1366.40	182.65	29	3	5026.60	671.96
4	6	118.97	15.90	15	6	1411.50	188.69	29	6	5112.90	683.49
4	7	123.42	16.50	15	9	1457.40	194.83	29	9	5199.90	695.13
4	8	127.95	17.10	16	.	1504.10	201.06	30	.	5287.70	706.86
4	9	132.56	17.72	16	3	1551.40	207.39	30	3	5376.20	718.69
4	10	137.25	18.35	16	6	1599.50	213.82	30	6	5465.40	730.62
4	11	142.02	18.99	16	9	1648.40	220.35	30	9	5555.40	742.64
5	..	146.88	19.63	17	.	1697.90	226.98	31	.	5646.10	754.77
5	1	151.82	20.29	17	3	1748.20	233.71	31	3	5737.50	766.99
5	2	156.83	20.97	17	6	1799.30	240.53	31	6	5829.70	779.31
5	3	161.93	21.65	17	9	1851.10	247.45	31	9	5922.60	791.73
5	4	167.12	22.34	18	.	1903.60	254.47	32	.	6016.20	804.25
5	5	172.38	23.04	18	3	1956.80	261.59	32	3	6110.60	816.88
5	6	177.72	23.76	18	6	2010.80	268.80	32	6	6205.70	829.53
5	7	183.15	24.48	18	9	2065.50	276.12	32	9	6301.50	842.39

31½ GALLONS EQUALS 1 BARREL

To find the capacity of tanks greater than the largest given in the table, look in the table for a tank of one-half of the given size and multiply its capacity by 4, or one of one-third its size, and multiply its capacity by 9, etc.

USEFUL INFORMATION

MANILA ROPE AND LINK BELTING

HORSE-POWER OF MANILA TRANSMISSION ROPE

The following table will be found applicable under ordinary conditions. Centrifugal force has been taken into consideration in its compilation.

HORSE-POWER TRANSMITTED BY SINGLE ROPES

Working strain = 200 d². (d = diameter of rope.)

Speed of Rope Feet, per Minute	Diameter of Rope, in Inches						
	$\frac{5}{8}$	$\frac{3}{4}$	1	$1\frac{1}{4}$	$1\frac{1}{2}$	$1\frac{3}{4}$	2
1,000.....	1.24	2.25	3.57	5.59	8.02	10.85	14.20
2,000.....	2.70	3.84	6.84	10.68	15.39	20.93	27.36
2,500.....	3.30	4.71	8.38	13.10	18.86	25.66	33.54
3,000.....	3.83	5.46	9.80	15.39	21.87	29.74	38.88
3,500.....	4.30	6.23	11.09	17.33	24.94	34.03	44.35
4,000.....	4.74	6.83	12.15	18.98	27.33	37.17	48.59
4,500.....	5.01	7.24	12.89	20.15	29.00	39.45	51.57
5,000.....	5.20	7.47	13.29	20.76	29.89	40.65	53.15
5,500.....	5.29	7.60	13.53	21.14	30.43	41.39	54.11
6,000.....	5.08	7.32	13.10	20.36	29.32	39.77	52.12
6,500.....	4.74	6.83	12.13	19.00	27.34	37.21	48.63
7,000.....	4.12	5.93	10.54	16.47	23.72	32.26	42.18
Smallest sheave, diameter, inches.....	26	30	42	54	60	72	84
Allowable wt., tension carriage, pounds....	80	110	200	300	450	600	750

The horse-power decreases when the velocity is above 5,500 feet on account of centrifugal force.

Transmission Rope should be given an occasional application of rope dressing for preservation and lubrication.

APPROXIMATE WEIGHT AND BREAKING STRENGTH OF MANILA ROPE

Size Diameter Inches	Approx. Wgt. per 100 feet, Lbs.	Breaking Strength, Lbs.	Size Diameter, Inches	Approx. Wgt. per 100 feet, Lbs.	Breaking Strength, Lbs.
$\frac{1}{2}$	10	2,400	$1\frac{1}{4}$	53	12,500
$\frac{5}{8}$	15	4,000	$1\frac{3}{8}$	65	15,400
$\frac{3}{4}$	20	4,700	$1\frac{1}{2}$	77	17,000
$\frac{7}{8}$	26	6,500	$1\frac{5}{8}$	90	20,000
1	34	7,500	$1\frac{3}{4}$	104	25,000
$1\frac{1}{8}$	43	10,500	2	136	30,000

HORSE-POWER TRANSMITTED BY LINK BELTING

Size	Speed, in Feet, per Minute									
	100	200	300	400	500	600	700	800	900	1,000
25	.2	.4	.6	.8	1.0	1.2	1.35	1.5	1.65	1.75
32	.35	.7	1.0	1.3	1.6	1.9	2.2	2.5	2.75	3.0
33	.4	.8	1.2	1.6	2.0	2.3	2.6	2.9	3.2	3.5
34	.45	.9	1.35	1.8	2.2	2.6	3.0	3.4	3.7	4.0
35										
42	.5	1.0	1.5	2.0	2.5	2.9	3.3	3.7	4.1	4.5
45	.55	1.1	1.65	2.2	2.7	3.2	3.6	4.0	4.4	4.8
52	.8	1.6	2.4	3.2	3.9	4.6	5.2	5.8	6.4	7.0
55	.75	1.50	2.25	3.0	3.75	4.4	5.0	5.5	6.0	6.5
57	1.0	2.0	3.0	4.0	4.7	5.4	6.1	6.8	7.4	8.0
62	1.0	2.0	3.0	4.0	4.7	5.4	6.1	6.8	7.4	8.0
67	1.3	2.6	3.9	5.2	6.3	7.3	8.2	9.0	9.8	10.5
77	1.5	3.0	4.5	6.0	7.25	8.5	9.5	10.5	11.25	12.0
78	1.75	3.5	5.25	7.0	8.5	9.75	11.0	12.0	13.0	14.0
88	2.0	4.0	6.0	8.0	9.75	11.25	12.75	14.0	15.0	16.0
103	3.5	7.0	10.0	12.5	15.0	17.0	19.0	20.5	22.0	23.0
114	4.0	8.0	12.0	15.0	17.0	19.0	21.0	23.0	25.0	27.0
124	4.5	9.0	13.5	17.0	20.0	22.0	24.0	26.0	28.0	30.0

USEFUL INFORMATION

CAPACITIES OF TROUGHED BELT CONVEYORS IN CUBIC FEET AND BUSHEL

The size of the lumps carried should vary according to the speed of the belt, being reduced as the speed is increased. The size given below is recommended as the maximum for a speed of 200 feet per minute, and we do not advise the handling of larger pieces.

Width of Belt, Inches	Maximum Lump, Inches	Capacities per Hour							
		Cubic Feet				Bushels			
		100 Ft. Per Min.	200 Ft. Per Min.	300 Ft. Per Min.	400 Ft. Per Min.	100 Ft. Per Min.	200 Ft. Per Min.	300 Ft. Per Min.	400 Ft. Per Min.
12	2½	240	480	720	960	192	384	576	768
14	3	430	860	1,290	1,720	344	688	1,032	1,376
16	4	625	1,250	1,875	2,500	500	1,000	1,500	2,000
18	5	815	1,630	2,445	3,260	652	1,304	1,956	2,608
20	6	1,000	2,000	3,000	4,000	800	1,600	2,400	3,200
22	7	1,200	2,400	3,600	4,800	960	1,920	2,880	3,840
24	9	1,370	2,740	4,110	5,480	1,096	2,192	3,288	4,384
26	10	1,600	3,200	4,800	6,400	1,280	2,560	3,840	5,120
28	12	1,820	3,640	5,460	7,280	1,456	2,912	4,368	5,824
30	14	2,060	4,120	6,180	8,240	1,660	3,320	4,980	6,640
32	15	2,320	4,640	6,960	9,280	1,860	3,720	5,580	7,440
36	18	2,880	5,760	8,640	11,520	2,304	4,608	6,912	9,216
40	20	3,500	7,000	10,500	14,000	2,800	5,600	8,400	11,200
42	20	3,850	7,700	11,550	14,400	3,080	6,160	9,240	12,320
48	24	4,950	9,900	13,850	19,800	3,960	7,920	11,880	15,840

SPACING

In handling grain a maximum spacing of 5 ft. 6 in. is recommended up to belts 30 in. wide and above this from 4 ft. to 4 ft. 6 in., according to the load carried and the speed of the belt.

For handling coal, stone, ore and similar materials a maximum spacing of 4 ft. 6 in. is recommended on belts up to 30 in., although satisfactory results are frequently obtained on spacing of 5 ft. centers for the carrying rolls. Above 30 in. width of belt we recommend a spacing on carrying side of 4 ft.

For the return side of the belt, rollers should be spaced approximately double spacing of the carrying side.

Recommended speeds for various materials:

Coke.....	250 ft. per min.	Fine Crushed Stone.....	350 ft. per min.
Lump Coal.....	250 ft. per min.	Coarse Crushed Stone.....	250 ft. per min.
Fine Coal.....	350 ft. per min.	Ore, Fine.....	300 ft. per min.
Dirt.....	350 ft. per min.	Sand and Gravel.....	350 ft. per min.

Grain belt frequently run from 600 to 800 and sometimes 1,000 feet per minute.

HORSE POWER REQUIRED TO DRIVE BELT CONVEYORS

With carrying rolls 6 in. in diameter; bearings well lubricated.

Level Belts

$$H. P. = W \times (0.2 \times L) \div 33,000.$$

Wherein

H. P. = Horse power.

W = Weight of material carried per minute in pounds.

L = Length of conveyor in feet.

H = Height lifted in feet.

Inclined Belts

$$H. P. = W \times [(0.2 \times L) + H] \div 33,000.$$

USEFUL INFORMATION

BELTING

The driving power of a single belt is usually taken as one horse-power for every inch of width at a speed of 600 to 700 feet per minute, from 400 to 500 feet per minute for a double belt.

TO FIND THE LENGTH OF BELT WANTED

Add the diameter of both pulleys together, divide by 2, and multiply quotient by $3\frac{1}{4}$; add this product to twice the distance in inches between the center of shafts, and the final sum will be the length required. Example. Diameter of large pulley 24 in. + 12 diameter of small pulley = $36 \div 2 = 18 \times 3\frac{1}{4} = 58\frac{1}{2} + 216$ twice distance between shafts = $274\frac{1}{2}$ inches, length required.

TO FIND WIDTH OF BELT

required for a given horse-power. Multiply the horse-power by the constant 2,750, then multiply the diameter of driven pulley by the number of revolutions and divide the first product by the latter, the quotient will be the width of belt required. Example. Horse-power $28 \times$ constant 2,750 = 77,000; diameter of pulley 36 in. \times revolution 200 = 7,200; $77,000 \div 7,200 = 10$ inches, width required.

TO FIND THE HORSE-POWER

which a belt will transmit. Multiply the width of belt by diameter of driven pulley in inches, multiply this product by revolutions per minute, then divide final product by constant 2,750, the quotient will be the horse-power. Example. Belt 10 in. \times 36 diameter of pulley = 360×200 revolutions = 72,000 \div 2,750 constant = 26.5 horse-power required.

THE HORSE-POWER AND WIDTH

of belt given, find the diameter of driven pulley required. Multiply the horse-power by constant 2,750, now multiply revolutions of pulley by width of belt, then divide the first product by the latter, the quotient will be the diameter wanted. Example. Horse-power $28 \times 2,750 = 77,000$; revolutions $200 \times 10 = 2,000$; $77,000 \div 2,000 = 38.5$, diameter wanted.

To find the size of driving pulley, multiply the diameter of driven by revolutions it should make, and divide the product by revolutions of driver. Example. Diameter of driven, 12 inches; revolutions, 240; revolutions of driver, 160; then $12 \times 240 = 2,880 \div 160 = 18$, diameter of driver wanted.

TO FIND THE SIZE OF DRIVEN PULLEY

Multiply diameter of driver by its revolutions, and divide the product by revolutions of driven. Example. Diameter of driver, 18; revolutions, 160; revolutions of driven, 240; then $18 \times 160 = 2,880 \div 240 = 12$, revolutions of driven wanted.

TO FIND THE NUMBER OF REVOLUTIONS OF DRIVEN

Multiply diameter of driver by its revolutions, and divide product by diameter of driven. Example. Diameter of driver, 18; revolutions, 160; diameter of driven, 12 inches; then $18 \times 160 = 2,880 \div 12 = 240$, revolutions of driven wanted.

TO FIND THE HORSE-POWER OF A DRIVING PULLEY

Multiply the circumference of pulley by the revolutions, and this product by width of belt, and divide final product by 600. Example. Circumference of pulley, 56.55; revolutions, 160; width of belt, 6 inches; then $56.55 \times 160 = 9,048 \times 6 = 54,288 \div 600 = 9.04$, horse-power of pulley wanted.

THE HORSE-POWER, DIAMETER OF PULLEY AND WIDTH OF BELT GIVEN

find the number of revolutions of driven pulley. Rule 5. Multiply the horse-power by 2,750, now multiply the diameter of pulley by the width of belt, and then divide the first product by the latter. Example 5. Horse-power $28 \times 2,750 = 77,000$; diameter 36×10 width = 360; $77,000 \div 360 = 211.4$, revolutions wanted.

The above rules assume that the driving and driven pulleys are of equal diameter, and the contact of belt half the circumference. If pulleys are of different diameter and contact of belt is less than half of circumference, then the rules must be modified as per tables below of areas of contact.

TABLE OF BELT CONTACTS

Degrees of Contact		Fraction of Contact	Dec. Fraction of Circumf.	Ratio	Constant—Single Belt	Double Belt
90°	or	$\frac{1}{4} =$	.25	2.21	6080	4250
112°	"	$\frac{1}{3} =$	.312	1.72	4730	3310
120°	"	$\frac{1}{2} =$	.333	1.6	4400	3080
135°	"	$\frac{3}{8} =$	.375	1.4	3850	2700
150°	"	$\frac{5}{12} =$	.417	1.24	3410	2390
165°	"	$\frac{7}{8} =$	.437	1.17	3220	2250
180°	"	$\frac{1}{2} =$	.500	1	2750	1925

For all practical purposes, the arc of contact of belt on smaller pulley can be roughly estimated by comparison with figures in first column in table above. For example, take arc of contact 150° and compare it with your belt. If it agrees approximately, then taking Rule 3 we have Example 3 modified as follows: Belt $10 \times 36 = 360 \times 200 = 72,000 \div$ by new constant 3,410 = 21.1 horse-power, or a loss of 5.4 horse power as compared with full contact or half circumference in Example 3.

USEFUL INFORMATION

BELTING

ASCERTAINING THE LENGTH OF A BELT

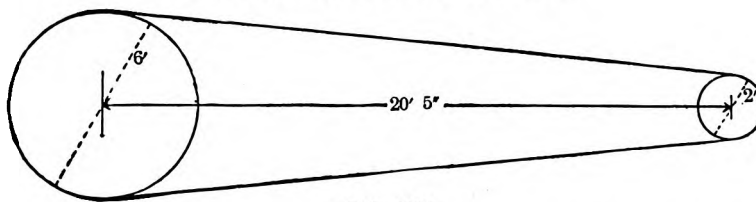


FIG. 2501

To ascertain the length of a belt, add the diameter of the two pulleys, multiply the sum by $3\frac{1}{7}$, divide the product by 2. Add to this sum twice the distance between centers and the result will be the required length. Example.

Diameter of Pulleys	6'	$2(25\frac{1}{7})$	Distance between center of shafts:	
	2'	12'6"	$\frac{1}{14}$	20'5"
	$\frac{8'}{2}$			20'5"
	$3\frac{1}{7}$			40'10"
	<u>24</u>			12'6 $\frac{1}{14}$ "
	25 $\frac{1}{7}$			53'4 $\frac{1}{14}$ "

If one pulley is considerably larger than the other, a little extra allowance should be made, as the distance from the center of the top of one to the center of the other is a little greater than the exact center of the shafts.

RULES FOR FINDING THE LENGTH OF CROSS BELTS

First find the length for straight belt; square each the diameter of the large pulley and the distance between centers; add together and extract square root of same. Subtract from the distance between centers. Multiply the remainder by two, and add to the length of straight belt as previously found. The result will be the required length.

TO FIND THE APPROXIMATE LENGTH OF BELT IN A ROLL WHEN CLOSELY COILED

Rule: Add together the diameter of the roll and the diameter of the center hole, both in inches; multiply by the number of coils in the roll and by 0.131. The result will be the approximate length in feet regardless of the thickness of the belt.

Example: How many feet of belting in a roll 48 inches in diameter with a 6-inch center hole and 60 coils?

$$\begin{aligned}
 48 + 6 &= 54 \\
 54 \times 60 &= 3240 \\
 3240 \times 0.131 &= 424.440, \text{ or about 424 feet 5 inches.}
 \end{aligned}$$

RULES FOR PIECING OUT BELTS

In order to calculate the changed length of belt when different size pulley is put on in place of one removed, take out of the belt, or put in one and a half times the difference of the diameter of the pulleys. Example: Take off a 10-inch pulley and put on a 24-inch one. Add 24-inch-10-inch $\times 1\frac{1}{2}$ inch-6-inch of a new belt to the existing one.

RULE FOR FINDING WIDTH OF BELT

When speed of belt in feet per minute and horse power wanted are given.

FOR SINGLE BELTS

Divide the speed of belt by 8. The horsepower wanted divided by this quotient will give the width of belt required.

Example. Required the width of single belt to transmit 100 horsepower. Engine pulley 72 inches in diameter; speed of engine 220 R. P. M.

$$\begin{aligned}
 8 \overline{) 4143} & \text{ (speed of belt per minute).} \\
 518 \overline{) 500.00} & \text{ (horse power wanted).} \\
 19 & \text{ inches (width of belt required).}
 \end{aligned}$$

FOR DOUBLE BELTS

Divide the speed of belt in feet per minute by 560. Divide the horsepower wanted by this quotient for the width of belt required.

Example. Required the width of double belt to transmit 500 horsepower.

Engine pulley, 72 inches in diameter; speed of engine, 220 R. P. M.

$$\begin{aligned}
 560 \overline{) 4143} & \text{ (speed of belt per minute).} \\
 74 \overline{) 500.00} & \text{ (horsepower wanted).} \\
 67\frac{1}{2} & \text{ inches (width of belt required).}
 \end{aligned}$$

USEFUL INFORMATION**BELTING AND STEEL PULLEYS****HORSEPOWER TRANSMITTED BY LEATHER BELTS****DRIVING POWER OF SINGLE BELTS****DRIVING POWER OF DOUBLE BELTS**

Speed in Feet per Minute	Width of Belt, Inches									Width of Belt, Inches								
	2	3	4	5	6	8	10	12	14	6	8	10	12	14	16	18	20	24
400	1	1½	2	2½	3	4	5	6	7	4¼	5¾	7¼	8½	10	11½	13	14½	17½
600	1½	2¼	3	3¾	4½	6	7½	9	10½	6½	8¾	11	13	15	17½	19½	22	26
800	2	3	4	5	6	8	10	12	14	8½	11½	14½	17½	20½	23	26	29	34½
1000	2½	3¾	5	6¼	7½	10	12½	15	17½	11	14½	18¼	21½	25½	29	32½	36	43½
1200	3	4½	7	7½	9	12	15	18	21	13	17½	22	26	30½	34½	39	44	52½
1500	3¾	5¾	7½	9½	11½	15	18¾	22½	26½	16¼	21¾	27¼	32½	38	43½	49	54½	65½
1800	4½	6¾	9	11¼	13½	18	22½	27	31½	19½	26	32¾	39	45½	52	59	65½	78½
2000	5	7½	10	12½	15	20	25	30	35	21¾	29	36½	43½	50½	58	65½	72½	87
2400	6	9	12	15	18	24	30	36	42	26	34¾	44	52½	60½	69½	78½	88	105
2800	7	10½	14	17½	21	28	35	42	49	30½	40½	51	61	71	81	91½	102	122
3000	7½	11¼	15	18¾	22½	30	37½	45	52½	32½	43½	54½	65½	76	87½	98	108	131
3500	8¾	13	17½	22	26	35	44	52½	61	38	50¾	63½	76	89	101	114	127	153
4000	10	15	20	25	30	40	50	60	70	43½	58¼	72¾	87	101	116	131	145	174
4500	11¼	17	22½	28	34	45	57	69	78	49	65	82	98	114	131	147	163	196
5000	12½	19	25	31	37½	50	62½	75	87	54½	72¾	91	109	127	145	163	182	218

HORSEPOWER OF STEEL PULLEYS

AT 100 R. P. M.

Multiply the table H.P. by the R. P. M. of shaft that is to be used and divide by 100.

Diameter in Inches	Width of Face in Inches											
	3	4	5	6	8	10	12	14	16	18	20	24
For Single 16 oz. Belts						For Double Leather Belts						
6	.6	.8	1.1	1.8	2.4	3.2	....	....	....	....	....	....
7	.7	.9	1.3	2.1	2.8	3.6	....	....	....	....	....	....
8	.8	1.1	1.4	2.4	3.2	4.4	7.0	....	....	....	....	....
9	1.0	1.3	1.7	3.0	4.0	5.2	8.5	....	....	....	....	....
10	1.1	1.4	1.8	3.3	4.5	5.6	9.0	....	....	....	....	....
11	1.3	1.6	1.9	3.6	4.8	6.4	9.5	....	....	....	....	....
12	1.4	1.8	2.1	5.6	7.0	8.4	11.2	12.6	14.0	....	....	....
14	1.5	2.0	2.4	6.0	7.8	9.6	12.0	13.8	15.6	....	....	....
16	1.7	2.3	2.5	6.8	8.5	10.2	13.6	15.3	17.0	....	....	....
18	1.9	2.5	3.1	7.6	10.0	12.4	15.2	17.6	20.0	....	....	....
20	2.1	2.8	3.5	8.4	11.2	14.0	16.8	19.6	22.4	....	....	....
22	2.3	3.1	3.8	9.2	12.3	15.4	18.4	21.5	24.6	27.6	30.8	36.8
24	2.5	3.3	4.1	10.0	13.3	16.6	20.0	23.3	26.6	30.0	33.2	40.0
26	2.7	3.6	4.5	10.8	14.5	18.2	21.6	25.3	29.0	32.4	36.4	43.2
28	2.9	3.9	4.8	11.6	15.5	19.4	23.2	27.1	31.0	34.8	38.8	46.4
30	3.1	4.1	5.4	12.4	16.6	20.8	24.8	29.0	33.2	37.2	41.6	49.6
32	3.4	4.5	5.6	13.6	18.0	22.4	27.2	31.6	36.0	40.8	44.8	54.4
34	3.5	4.7	5.9	14.0	18.8	23.6	28.0	32.8	37.6	42.0	47.2	56.0
36	3.7	5.0	6.2	14.8	19.9	25.0	29.6	34.7	39.8	44.4	50.0	59.2
38	4.0	5.3	6.7	16.0	21.4	26.8	32.0	37.4	42.8	48.0	53.6	64.0
40	4.2	5.6	6.9	16.8	22.3	27.8	33.6	39.1	44.6	50.4	55.6	67.2
42	4.4	5.9	7.6	17.6	23.5	29.4	35.2	41.1	47.0	52.8	58.8	70.4
44	4.6	6.1	7.8	18.4	24.6	30.8	36.8	43.0	49.2	55.2	62.6	73.6
46	4.7	6.3	7.9	18.8	25.2	31.6	37.6	44.0	50.4	56.4	63.2	75.2
48	5.0	6.8	8.3	20.0	26.7	33.4	40.0	46.7	53.4	60.0	66.4	80.0
50	5.2	7.0	8.7	20.8	27.8	34.9	41.6	48.6	55.7	62.4	67.8	83.2
52	5.4	7.2	9.1	21.6	29.0	36.4	43.2	50.6	58.0	64.8	73.8	86.4
54	5.7	7.6	9.4	22.8	30.2	37.7	45.6	53.0	60.5	66.4	75.4	91.2

RULE FOR FINDING HORSE POWER THAT STEEL PULLEYS WILL TRANSMIT

Multiply the circumference of the pulley in feet, by the number of revolutions per minute, by the width of the pulley face in inches, by 85, and divide by 33,000. Thus:

$$\text{Horse Power} = \frac{C \times R \times W \times 85}{33,000}$$

USEFUL INFORMATION

WOOD SPLIT PULLEYS AND SHAFTING

HORSE POWER OF WOOD SPLIT PULLEYS

Authorities vary as to the power a wood split pulley will transmit.

Much depends on the method of construction and the quality of material used. If the best is used in each instance a wood split pulley will transmit as much power as any other pulley, but care must be taken that the wood split pulley is kept tight on the shaft.

HORSE POWERS OF SHAFTING UNDER DIFFERENT CONDITIONS

Diam. of Shaft	For Head Shafts, Heavy Strains, shafts with gears, etc.								For Line Shafts, with bearings every 8 ft.								For simple transmission of power with no bending strains.							
	H. P. = $\frac{D^3 R}{125}$								H. P. = $\frac{D^3 R}{75}$								H. P. = $\frac{D^3 R}{50}$							
	Revolutions per minute								Revolutions per minute								Revolutions per minute							
	50	100	150	200	250	300	400	500	50	100	150	200	250	300	400	500	50	100	150	200	250	300	400	500
1 $\frac{1}{8}$	0.6	1.3	1.8	2.6	3.3	4	5	6	1	2	3	4	6	7	9	11	2	3	5	7	8	10	13	17
1 $\frac{1}{4}$	1.2	2.3	4	5	6	7	9	12	2	4	6	8	10	12	16	20	3	6	9	12	15	18	24	30
1 $\frac{3}{8}$	2	4	6	8	10	11	15	19	3	6	10	13	16	19	26	32	5	10	14	19	24	29	38	48
1 $\frac{1}{2}$	3	6	9	12	15	17	23	29	5	10	15	19	24	29	39	48	7	15	22	29	36	44	58	73
2 $\frac{1}{8}$	4	8	13	17	21	25	33	42	7	14	21	28	35	42	56	70	10	21	31	42	52	63	84	105
2 $\frac{1}{4}$	6	12	17	23	29	34	46	58	10	19	29	39	48	58	77	97	14	29	43	58	72	87	116	145
2 $\frac{3}{8}$	8	15	23	31	39	46	62	78	13	26	39	52	65	78	104	129	19	39	58	78	97	117	155	194
2 $\frac{1}{2}$	10	20	30	40	50	61	81	100	17	34	51	68	85	101	135	169	25	51	76	101	127	152	203	254
3 $\frac{1}{8}$	16	32	49	65	81	97	130	162	27	54	81	108	135	163	217	271	41	81	122	163	203	244	325	406
3 $\frac{1}{4}$	24	49	73	98	122	146	195	244	41	81	122	163	204	244	326	407	61	122	183	244	305	366	488	610
4 $\frac{1}{8}$	35	70	105	140	175	210	280	...	58	117	175	233	291	350	466	...	87	175	262	350	437	524	699	...
4 $\frac{1}{4}$	48	96	144	192	240	290	385	...	80	161	241	321	401	481	642	...	120	241	361	482	602	723	963	...
5 $\frac{1}{8}$	66	133	200	265	332	400	...	...	111	222	333	444	555	666	...	...	166	333	499	666	832	998	...	...
6	86	173	260	345	432	520	...	...	144	288	432	576	720	...	...	...	216	432	648	864	1080	1296	...	...
6 $\frac{1}{2}$	110	220	330	440	550	...	...	...	183	366	549	732	915	...	...	...	275	549	824	1099	1373	...	...	...
7	137	275	412	550	686	...	...	...	229	457	686	915	1143	...	...	...	343	686	1029	1372	1715	...	...	...
7 $\frac{1}{2}$	170	337	506	675	...	...	...	...	281	563	844	1125	...	...	...	...	422	844	1266	1688	...	...	...	...
8	205	410	614	820	...	...	...	...	341	683	1024	1365	...	...	...	...	512	1024	1536	2048	...	...	...	...

MAXIMUM DISTANCE BETWEEN BEARINGS FOR LINE SHAFT SERVICE

Size Shaft.....	1 $\frac{1}{8}$	1 $\frac{1}{4}$	1 $\frac{3}{8}$	2 $\frac{1}{8}$	2 $\frac{1}{4}$	2 $\frac{3}{8}$	2 $\frac{1}{2}$	3 $\frac{1}{8}$	3 $\frac{1}{4}$	3 $\frac{1}{2}$
Max. Dist.....	6' 8"	7' 2"	8' 2"	8' 9"	9' 6"	10' 2"	10' 8"	11' 4"	12' 0"	12' 5"

USEFUL INFORMATION

GRINDING SUGGESTIONS

The time saved on a single piece often pays for changing the wheel.

When work is duplicated the loss by using an unsuitable wheel becomes very great. Late experience shows it to be practicable to remove one cubic inch of steel per minute from cylindrical work by grinding with suitable wheels.

Select the wheel to produce the largest saving in time and best results in quality.

Soda water increases the product from any given wheel.

Don't believe that all materials can be ground equally well with one and the same carborundum or emery wheel.

Grinding wheels are numbered from coarse to fine, and graded from soft to hard, the grade being denoted by the letters of the alphabet.

Don't attempt to decide on the right wheel without knowing the full details.

Spindle speed and character of the material, shape of work to be ground, and surface of wheel in contact are prime factors.

In cylindrical grinding, speed of work, diameter of work, and depth of cut must all be reckoned with in the selection of the right combination of grain and grade.

Don't order a certain grade wheel merely because that grade is used on similar work in another plant.

Don't use a hard wheel to economize—it is production you are after; big production is economy.

A hard wheel is more apt to change the temperature of the work or to become glazed than a soft one; furthermore, it requires more power to do the same amount of work.

Don't get a wheel made for soft steel for use on hard steel. The width of the wheel should be in proportion to the amount of the material to be removed with each revolution of the work. Never mount wheels without flanges.

A heavy, rigid machine is a big step toward good grinding results.

Don't start work on a new wheel until you are sure it runs true.

To get a true surface, you must keep the face of the wheel true.

Don't start to grind until you know the speed is right—not "near enough," but right.

To increase the speed of a grinding wheel gives the effect of a harder wheel, decreasing the speed gives the effect of a softer wheel.

For surface grinding, it is customary to run wheels at somewhat slower rate of speed than for general grinding. A speed of 4,000 to 5,000 surface feet is usually employed.

Transferring a wheel after worn down to a small diameter from a large machine to a small one, is a good plan.

A wheel is affected by its treatment.

Don't grind round work dry.

A carborundum wheel will grind in water, soda water, or oil.

The particles from a carborundum wheel do not adhere to steel. Don't let anyone convince you to the contrary.

Don't use a grinding wheel like a piece of cast iron. It is meant for work, but not for abuse.

WEIGHTS OF MACHINE BOLTS

WITH SQUARE HEADS AND SQUARE NUTS

APPROXIMATELY PER 100

Length Inches	1/4 Lbs.	3/8 Lbs.	1/2 Lbs.	5/8 Lbs.	3/4 Lbs.	7/8 Lbs.	1 Lbs.	1 1/8 Lbs.	1 1/4 Lbs.	1 3/8 Lbs.	1 1/2 Lbs.	1 5/8 Lbs.	1 3/4 Lbs.	1 7/8 Lbs.	2 Lbs.
3/4	2.55	4.4	7.71	10.53	13.4	16.3	19.2	22.1	25.0	27.9	30.8	33.7	36.6	39.5	42.4
1	2.64	4.65	8.04	10.53	13.4	16.3	19.2	22.1	25.0	27.9	30.8	33.7	36.6	39.5	42.4
1 1/4	2.73	4.9	8.38	11.03	13.9	16.8	19.7	22.6	25.5	28.4	31.3	34.2	37.1	40.0	42.9
1 1/2	2.9	5.4	9.01	11.9	14.8	17.7	20.6	23.5	26.4	29.3	32.2	35.1	38.0	40.9	43.8
2	3.08	5.9	9.66	12.8	15.7	18.6	21.5	24.4	27.3	30.2	33.1	36.0	38.9	41.8	44.7
2 1/4	3.43	6.8	10.94	14.5	17.4	20.3	23.2	26.1	29.0	31.9	34.8	37.7	40.6	43.5	46.4
2 1/2	4.45	7.8	12.74	17.25	20.1	23.0	25.9	28.8	31.7	34.6	37.5	40.4	43.3	46.2	49.1
3	5.45	8.7	14.37	18.75	21.6	24.5	27.4	30.3	33.2	36.1	39.0	41.9	44.8	47.7	50.6
3 1/4	6.46	9.7	15.83	20.90	23.8	26.7	29.6	32.5	35.4	38.3	41.2	44.1	47.0	49.9	52.8
3 1/2	7.09	10.7	17.3	23.09	26.0	28.9	31.8	34.7	37.6	40.5	43.4	46.3	49.2	52.1	55.0
4	7.7	11.7	18.76	25.27	28.2	31.1	34.0	36.9	39.8	42.7	45.6	48.5	51.4	54.3	57.2
4 1/4	8.3	12.7	20.2	27.50	30.4	33.3	36.2	39.1	42.0	44.9	47.8	50.7	53.6	56.5	59.4
5	8.9	13.7	21.58	29.59	32.5	35.4	38.3	41.2	44.1	47.0	49.9	52.8	55.7	58.6	61.5
5 1/4	9.5	14.7	22.95	31.68	34.6	37.5	40.4	43.3	46.2	49.1	52.0	54.9	57.8	60.7	63.6
6	10.2	15.7	24.42	33.9	36.8	39.7	42.6	45.5	48.4	51.3	54.2	57.1	60.0	62.9	65.8
6 1/4	10.8	16.7	25.9	35.73	38.6	41.5	44.4	47.3	50.2	53.1	56.0	58.9	61.8	64.7	67.6
7	11.5	17.7	27.37	37.56	40.4	43.3	46.2	49.1	52.0	54.9	57.8	60.7	63.6	66.5	69.4
7 1/4	12.1	18.7	28.84	39.1	42.0	44.9	47.8	50.7	53.6	56.5	59.4	62.3	65.2	68.1	71.0
8	13.4	20.8	31.8	43.18	46.0	48.9	51.8	54.7	57.6	60.5	63.4	66.3	69.2	72.1	75.0
9	14.6	22.9	34.75	47.36	50.2	53.1	56.0	58.9	61.8	64.7	67.6	70.5	73.4	76.3	79.2
10	15.8	24.9	37.7	51.6	54.5	57.4	60.3	63.2	66.1	69.0	71.9	74.8	77.7	80.6	83.5
11	17.2	26.9	40.65	55.76	58.6	61.5	64.4	67.3	70.2	73.1	76.0	78.9	81.8	84.7	87.6
12	18.7	28.9	43.6	59.92	62.8	65.7	68.6	71.5	74.4	77.3	80.2	83.1	86.0	88.9	91.8
13	19.4	31.0	46.55	64.20	67.1	70.0	72.9	75.8	78.7	81.6	84.5	87.4	90.3	93.2	96.1
14	20.6	33.	49.5	68.36	71.2	74.1	77.0	79.9	82.8	85.7	88.6	91.5	94.4	97.3	100.2
15	21.8	35.	52.45	72.52	75.4	78.3	81.2	84.1	87.0	89.9	92.8	95.7	98.6	101.5	104.4
16	23.	37.	55.4	76.68	79.5	82.4	85.3	88.2	91.1	94.0	96.9	99.8	102.7	105.6	108.5
17	24.2	39.	58.35	80.84	83.7	86.6	89.5	92.4	95.3	98.2	101.1	104.0	106.9	109.8	112.7
18	25.4	41.	61.3	85.	87.9	90.8	93.7	96.6	99.5	102.4	105.3	108.2	111.1	114.0	116.9
19	26.6	43.	64.25	89.16	92.0	94.9	97.8	100.7	103.6	106.5	109.4	112.3	115.2	118.1	121.0
20	27.8	45.	67.20	93.32	96.2	99.1	102.0	104.9	107.8	110.7	113.6	116.5	119.4	122.3	125.2
21	29.	47.	70.15	97.48	100.3	103.2	106.1	109.0	111.9	114.8	117.7	120.6	123.5	126.4	129.3
22	30.2	49.	73.1	101.64	104.5	107.4	110.3	113.2	116.1	119.0	121.9	124.8	127.7	130.6	133.5
23	31.4	51.	76.05	105.80	108.7	111.6	114.5	117.4	120.3	123.2	126.1	129.0	131.9	134.8	137.7
24	32.6	53.	79.	109.96	112.8	115.7	118.6	121.5	124.4	127.3	130.2	133.1	136.0	138.9	141.8
25	33.8	55.	81.95	114.12	117.0	119.9	122.8	125.7	128.6	131.5	134.4	137.3	140.2	143.1	146.0
26	35.	57.	84.9	118.28	121.1	124.0	126.9	129.8	132.7	135.6	138.5	141.4	144.3	147.2	150.1
27	36.2	59.	87.8	122.44	125.3	128.2	131.1	134.0	136.9	139.8	142.7	145.6	148.5	151.4	154.3
28	37.4	61.	90.75	126.60	129.5	132.4	135.3	138.2	141.1	144.0	146.9	149.8	152.7	155.6	158.5
29	38.6	63.	93.7	130.76	133.6	136.5	139.4	142.3	145.2	148.1	151.0	153.9	156.8	159.7	162.6
30															

WEIGHTS OF

CARRIAGE BOLTS

WITH SQUARE NUTS

APPROXIMATELY PER 100

Length	1/4	3/8	1/2	5/8	3/4	7/8	1	1 1/8	1 1/4	1 3/8	1 1/2	1 5/8	1 3/4	1 7/8	2
1	1.9	3	5	7.5	10.5	13.5	16.5	19.5	22.5	25.5	28.5	31.5	34.5	37.5	40.5
1 1/4	2.1	3.4	5.6	8.2	11.5	14.5	17.5	20.5	23.5	26.5	29.5	32.5	35.5	38.5	41.5
1 1/2	2.3	3.7	6.2	9	13.5	16.5	19.5	22.5	25.5	28.5	31.5	34.5	37.5	40.5	43.5
2	2.5	4.2	7.2	10.7	15.5	18.5	21.5	24.5	27.5	30.5	33.5	36.5	39.5	42.5	45.5
2 1/4	3.1	4.9	8.2	12.2	17.5	20.5	23.5	26.5	29.5	32.5	35.5	38.5	41.5	44.5	47.5
3	3.5	5.6	9.2	13.6	19.5	22.5	25.5	28.5	31.5	34.5	37.5	40.5	43.5	46.5	49.5
3 1/4	3.8	6.2	10.2	15.2	21.5	24.5	27.5	30.5	33.5	36.5	39.5	42.5	45.5	48.5	51.5
4	4.2	7	11.2	16.7	23.5	26.5	29.5	32.5	35.5	38.5	41.5	44.5	47.5	50.5	53.5
4 1/4	4.7	7.7	12.4	18.2	25.5	28.5	31.5	34.5	37.5	40.5	43.5	46.5	49.5	52.5	55.5
5	5.1	8.5	13.5	19.5	27.5	30.5	33.5	36.5	39.5	42.5	45.5	48.5	51.5	54.5	57.5
5 1/4	5.6	9.2	14.5	21	29.5	32.5	35.5	38.5	41.5	44.5	47.5	50.5	53.5	56.5	59.5
6	6.1	10	16	22.6	32	35	38	41	44	47	50	53	56	59	62
6 1/4	6.6	10.5	17.2	24	33.7	36.7	39.7	42.7	45.7	48.7	51.7	54.7	57.7	60.7	63.7
7	7.1	11.1	18.1	25.6	35.8	38.8	41.8	44.8	47.8	50.8	53.8	56.8	59.8	62.8	65.8
7 1/4	7.7	11.7	19.2	27.1	38	41	44	47	50	53	56	59	62	65	68
8	8.2	12.5	20.3	28.6	40	43	46	49	52	55	58	61	64	67	70
9	8.8	13.5	21.9	31.5	44	47	50	53	56	59	62	65	68	71	74
10	9.4	14.5	23.9	34.2	48	51	54	57	60	63	66	69	72	75	78
11	10.0	15.5	25.9	37.8	51.6	54	57	60	63	66	69	72	75	78	81
12	10.6	16.5	27.9	41	56	59	62	65	68	71	74	77	80	83	86
13	11.2	17.5	29.9	44	59	62	65	68	71	74	77	80	83	86	89
14	11.8	18.5	31.9	47	62	65	68	71	74	77	80	83	86	89	92
15	12.4	19.5	33.9	50	65	68	71	74	77	80	83	86	89	92	95
16	13.0	20.5	35.9	53	68	71	74	77	80	83	86	89	92	95	98
17	13.6	21.5	37.9	56	71	74	77	80	83	86	89	92	95	98	101
18	14.2	22.5	39.9	59	74	77	80	83	86	89	92	95	98	101	104
19	14.8	23.5	41.9	62	77	80	83	86	89	92	95	98	101	104	107
20	15.4	24.5	43.9	65	80	83	86	89	92	95	98	101	104	107	110

USEFUL INFORMATION

WEIGHT OF BAR STEEL

SQUARE, ROUND, OCTAGON AND GROOVED

Per lineal foot in pounds.

Inch.	$\frac{1}{8}$	$\frac{3}{16}$	$\frac{1}{4}$	$\frac{5}{16}$	$\frac{3}{8}$	$\frac{7}{16}$	$\frac{1}{2}$	$\frac{9}{16}$	$\frac{5}{8}$	$\frac{11}{16}$	$\frac{3}{4}$	$\frac{13}{16}$	$\frac{7}{8}$	$1\frac{1}{8}$
Square	.05	.12	.21	.33	.48	.65	.85	1.08	1.33	1.61	1.92	2.24	2.60	3.06
Round	.04	.09	.17	.26	.38	.51	.67	.85	1.04	1.27	1.50	1.76	2.04	2.35
Octagon	.04	.10	.18	.28	.40	.54	.70	.89	1.10	1.33	1.58	1.83	2.16	2.48
Grooved			.216	.339							.97		1.32	
Square, Twisted					.487		.867		1.35		1.95		2.65	

Inches	1	$1\frac{1}{8}$	$1\frac{1}{4}$	$1\frac{3}{8}$	$1\frac{1}{2}$	$1\frac{5}{8}$	$1\frac{3}{4}$	$1\frac{7}{8}$	2	$2\frac{1}{8}$	$2\frac{1}{4}$	$2\frac{3}{8}$	$2\frac{1}{2}$	$2\frac{5}{8}$
Square	3.40	4.30	5.31	6.43	7.65	8.98	10.40	11.90	13.60	15.40	17.20	19.20	21.20	23.50
Round	2.67	3.38	4.17	5.05	6.01	7.05	8.18	9.38	10.71	12.05	13.60	15.10	16.68	18.39
Octagon	2.82	3.56	4.40	5.32	6.34	7.32	8.64	9.92	11.28	12.71	14.24	15.88	17.65	19.45
Grooved	1.73	2.63	3.46	4.15	4.68		5.06		5.81		7.98		9.83	
Square, Twisted	3.47	4.39	5.42	6.56	7.80									

Inches	$2\frac{3}{4}$	$2\frac{7}{8}$	3	$3\frac{1}{8}$	$3\frac{1}{4}$	$3\frac{3}{8}$	$3\frac{1}{2}$	$3\frac{5}{8}$	$3\frac{3}{4}$	4	$4\frac{1}{4}$	$4\frac{1}{2}$	$4\frac{3}{4}$	5
Square	25.70	28.20	30.60	33.13	35.90	38.64	41.60	44.57	47.80	54.40	61.40	68.90	76.70	85.00
Round	20.18	22.06	24.10	26.12	28.30	30.45	32.70	35.20	37.54	42.72	48.30	54.60	60.30	66.80
Octagon	21.28	23.28	25.36	27.50	29.28	32.10	34.56	37.05	39.68	45.12	50.84	56.96	63.52	70.60

FLAT

Per lineal foot in pounds.

Thickness, Inch	Width, Inches.																		
	$\frac{1}{2}$	$\frac{5}{8}$	$\frac{3}{4}$	$\frac{7}{8}$	1	$1\frac{1}{8}$	$1\frac{1}{4}$	$1\frac{3}{8}$	$1\frac{1}{2}$	$1\frac{3}{4}$	2	$2\frac{1}{4}$	$2\frac{1}{2}$	$2\frac{3}{4}$	3	$3\frac{1}{2}$	4	5	6
$\frac{1}{8}$	.213	.266	.320	.372	.426	.479	.530	.585	.640	.745	.850	.955	1.07	1.18	1.28	1.49	1.70	2.13	2.56
$\frac{1}{4}$	.319	.399	.480	.558	.639	.718	.790	.878	.960	1.12	1.28	1.43	1.60	1.76	1.92	2.24	2.55	3.20	3.83
$\frac{3}{8}$	.425	.533	.640	.743	.852	.958	1.06	1.17	1.28	1.49	1.70	1.91	2.13	2.34	2.56	2.98	3.40	4.26	5.11
$\frac{1}{2}$	.531	.665	.800	.929	1.06	1.20	1.33	1.46	1.60	1.86	2.13	2.30	2.66	2.92	3.19	3.72	4.25	5.32	6.38
$\frac{5}{8}$	.638	.798	.960	1.12	1.28	1.43	1.59	1.75	1.91	2.23	2.55	2.87	3.20	3.51	3.83	4.46	5.10	6.40	7.66
$\frac{3}{4}$	.744	.931	1.12	1.30	1.49	1.67	1.86	2.05	2.23	2.60	2.98	3.35	3.72	4.09	4.46	5.21	5.95	7.44	8.92
$1\frac{1}{8}$	1.07	1.28	1.49	1.70	1.91	2.13	2.34	2.55	2.98	3.40	3.83	4.26	4.68	5.10	5.96	6.80	8.52	10.20	12.78
$1\frac{1}{4}$	1.20	1.44	1.67	1.91	2.15	2.39	2.63	2.87	3.35	3.83	4.30	4.78	5.26	5.74	6.69	7.65	9.56	11.50	14.00
$1\frac{3}{8}$	1.60	1.86	2.12	2.39	2.66	2.92	3.19	3.72	4.26	4.79	5.32	5.86	6.39	7.44	8.52	10.64	12.78	15.30	17.88
$1\frac{1}{2}$	1.76	2.04	2.34	2.63	2.92	3.22	3.51	4.09	4.68	5.26	5.84	6.43	7.01	8.18	9.35	11.70	14.00	16.60	19.45
$1\frac{3}{4}$			2.23	2.55	2.86	3.19	3.50	3.83	4.46	5.10	5.74	6.40	7.02	7.65	8.92	10.20	12.80	15.30	18.39
$1\frac{7}{8}$			2.41	2.76	3.11	3.45	3.80	4.14	4.83	5.53	6.22	6.91	7.60	8.29	9.67	11.10	13.80	16.60	19.88
2				2.98	3.34	3.72	4.09	4.46	5.21	5.96	6.70	7.46	8.19	8.94	10.42	11.92	14.92	17.88	21.45
$2\frac{1}{8}$				3.19	3.59	3.98	4.38	4.78	5.58	6.38	7.17	7.97	8.77	9.56	11.20	12.80	15.90	19.10	22.95
$2\frac{1}{4}$				3.82	4.25	4.68	5.10	5.96	6.80	7.66	8.52	9.36	10.20	11.92	13.60	17.04	20.40	24.40	28.95
$2\frac{3}{8}$				4.78	5.27	5.74	6.71	7.65	8.61	9.59	10.54	11.48	13.41	15.30	19.17	22.95	27.95	33.60	39.60
$2\frac{1}{2}$							5.85	6.38	7.45	8.50	9.57	10.65	11.71	12.76	14.90	17.00	21.30	25.61	30.60
$2\frac{7}{8}$							7.02	7.67	8.94	10.20	11.49	12.78	14.04	15.30	17.88	20.40	25.56	30.60	

WEIGHT OF ROUND AND SQUARE IRON

Per lineal foot in pounds

Inch	Round	Square	Inches	Round	Square	Inches	Round	Square	Inches	Round	Square
$\frac{1}{4}$	.0930	.1184	1	2.645	3.368	$2\frac{1}{4}$	13.39	17.05	4	42.33	53.89
$\frac{3}{8}$	.1653	.2105	$1\frac{1}{8}$	3.348	4.263	$2\frac{3}{8}$	14.92	19.00	$4\frac{1}{2}$	53.57	
$\frac{1}{2}$	.2583	.3290	$1\frac{1}{4}$	4.133	5.263	$2\frac{1}{2}$	16.53	21.05	5	66.13	
$\frac{5}{8}$	.3720	.4736	$1\frac{3}{8}$	5.001	6.368	$2\frac{5}{8}$	18.23	23.21	$5\frac{1}{2}$	80.02	
$\frac{3}{4}$	.5063	.6446	$1\frac{1}{2}$	5.952	7.578	$2\frac{3}{4}$	20.01	25.47	6	95.23	
$1\frac{1}{8}$	.6613	.8420	$1\frac{5}{8}$	6.985	8.893	3	23.81	30.31	$6\frac{1}{2}$	111.8	
$1\frac{1}{4}$	.8370	1.066	$1\frac{3}{4}$	8.101	10.31	$3\frac{1}{4}$	27.94	35.57	7	129.6	
$1\frac{3}{8}$	1.033	1.316	$1\frac{7}{8}$	9.300	11.84	$3\frac{1}{2}$	32.41	41.26	8	169.3	
$1\frac{1}{2}$	1.488	1.895	2	10.58	13.47	$3\frac{3}{4}$	37.20	47.37	...	...
$1\frac{3}{4}$	2.025	2.579	$2\frac{1}{8}$	11.95	15.21	...	...	...	...	...

USEFUL INFORMATION

WEIGHT OF FLAT IRON

Per lineal foot in pounds

Width In Inches	Thickness in Inches												
	¼	⅕	⅜	½	⅝	¾	⅞	1	1¼	1½	1¾	2	2½
½	.422	.52	.634	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
¾	.633	.79	.950	1.26	1.58	.....	.....	.....	.....	.....	.....	.....	.....
1	.830	1.05	1.25	1.67	2.08	2.50	2.92	3.33	4.17	5.00	5.83	6.67	8.33
1⅛	.930	1.18	1.40	1.87	2.34	2.81	3.38	3.75	4.75	5.70	6.70	7.65	9.57
1¼	1.04	1.32	1.56	2.08	2.60	3.12	3.64	4.17	5.21	6.25	7.29	8.33	10.42
1⅝	1.14	1.45	1.71	2.29	2.86	3.40	4.01	4.58	5.77	6.97	8.18	9.35	11.69
1½	1.25	1.58	1.88	2.50	3.13	3.75	4.38	5.00	6.25	7.50	8.75	10.00	12.50
1¾	1.46	1.84	2.19	2.92	3.65	4.37	5.10	5.83	7.29	8.75	10.21	11.67	14.58
2	1.67	2.11	2.50	3.33	4.17	5.00	5.83	6.67	8.33	10.00	11.67	13.33	16.67
2¼	1.88	2.37	2.81	3.75	4.69	5.63	6.56	7.50	9.37	11.25	12.13	15.00	18.75
2½	2.08	2.63	3.12	4.17	5.21	6.25	7.29	8.33	10.42	12.50	14.58	16.66	20.83
2¾	2.29	2.89	3.44	4.59	5.73	6.87	8.02	9.17	11.46	13.75	16.04	18.33	22.91
3	2.50	3.16	3.75	5.00	6.25	7.50	8.75	10.00	12.50	15.00	17.50	20.00	25.00
3¼	2.70	3.42	4.06	5.41	6.77	8.12	9.47	10.83	13.65	16.47	19.34	22.10	27.50
3½	2.92	3.68	4.38	5.83	7.29	8.75	10.21	11.67	14.58	17.50	20.41	23.33	29.15
3¾	3.11	3.95	4.58	6.25	7.80	9.37	10.93	12.50	15.75	19.00	22.32	25.50	31.10
4	3.33	4.21	5.00	6.67	8.33	10.00	11.67	13.33	16.67	20.00	23.33	26.67	33.33
4½	3.75	4.74	5.63	7.50	9.38	11.25	13.13	15.00	18.75	22.50	26.24	30.00	37.49
5	4.17	5.26	6.25	8.34	10.42	12.50	14.59	16.67	20.84	25.00	29.16	33.33	41.66
6	5.00	6.32	7.50	10.00	12.50	15.00	17.50	20.00	25.01	30.00	34.99	40.00	49.99
7	5.83	7.29	8.75	11.67	14.58	17.50	20.42	23.33	29.18	35.00	40.82	46.67	58.32
8	6.67	8.33	10.00	13.33	16.67	20.00	23.33	26.67	33.35	40.00	46.65	53.34	66.65
10	8.33	10.41	12.50	16.67	20.83	25.00	29.17	33.33	41.68	50.00	58.31	66.68	83.31
12	10.00	12.50	15.00	20.00	25.00	30.00	35.00	40.00	50.01	60.00	69.97	80.01	99.97

WEIGHT OF IRON AND STEEL SHEETS

WEIGHTS IN POUNDS PER SQUARE FOOT—KENT

Thickness by Birmingham Gauge. U. S. Standard Gauge, 1893.

No. Gauge	Thick. ness	Iron	Steel	No. Gauge	Thick- ness Inches (Ap- prox.)	Iron	Steel	No. Gauge	Thick- ness Inches	Iron	Steel	No. Gauge	Thickness In. (Approx)	Iron	Steel
.....	.....	.....	.....	0000000	0.5	20.	20.40	18	.049	1.96	2.00	18	0.05	2.	2.04
.....	.....	.....	.....	0000000	0.4688	18.75	19.125	19	.042	1.68	1.71	19	0.0438	1.75	1.785
.....	.....	.....	.....	0000000	0.4375	17.50	17.85	20	.035	1.40	1.43	20	0.0375	1.50	1.53
0000	0.454	18.16	18.52	0000000	0.4063	16.25	16.575	21	.032	1.28	1.31	21	0.0344	1.375	1.402
000	.425	17.00	17.34	0000000	0.375	15.	15.30	22	.028	1.12	1.14	22	0.0312	1.25	1.275
00	.38	15.20	15.50	0000000	0.3438	13.75	14.025	23	.025	1.00	1.02	23	0.0281	1.125	1.147
0	.34	13.60	13.87	0000000	0.3125	12.50	12.75	24	.022	.88	.898	24	0.025	1.	1.02
1	.3	12.00	12.24	0000000	0.2813	11.25	11.475	25	.02	.80	.816	25	0.0219	0.875	0.892
2	.284	11.36	11.59	0000000	0.2500	10.00	10.25	26	.018	.72	.734	26	0.0188	0.75	0.765
3	.259	10.36	10.57	0000000	0.2188	8.75	8.925	27	.016	.64	.653	27	0.0172	0.6875	0.701
4	.238	9.52	9.71	0000000	0.1875	7.5	7.65	28	.014	.56	.571	28	0.0156	0.625	0.637
5	.22	8.80	8.98	0000000	0.1563	6.25	6.375	29	.013	.52	.530	29	0.0141	0.5625	0.574
6	.203	8.12	8.28	0000000	0.1250	5.00	5.125	30	.012	.48	.490	30	0.0125	0.5	0.51
7	.18	7.20	7.34	0000000	0.1094	4.375	4.462	31	.01	.40	.408	31	0.0109	0.4375	0.446
8	.165	6.60	6.73	0000000	0.0938	3.75	3.825	32	.009	.36	.367	32	0.0102	0.40625	0.414
9	.148	5.92	6.04	0000000	0.0781	3.125	3.187	33	.008	.32	.326	33	0.0094	0.375	0.382
10	.134	5.36	5.47	0000000	0.0625	2.5	2.55	34	.007	.28	.286	34	0.0086	0.34375	0.351
11	.12	4.80	4.90	0000000	0.0500	2.0	2.05	35	.005	.20	.204	35	0.0078	0.3125	0.319
12	.109	4.36	4.45	0000000	0.0406	1.625	1.662	36	.004	.16	.163	36	0.0070	0.28125	0.287
13	.095	3.80	3.88	0000000	0.0313	1.25	1.281	37	.....	.....	.....	37	0.0066	0.26562	0.271
14	.083	3.32	3.39	0000000	0.0250	1.0	1.025	38	.....	.....	.....	38	0.0063	0.25	0.255
15	.072	2.88	2.94	0000000	0.0200	0.8	0.812	Specific gravity.....Iron 7.7 Steel.....7.854							
16	.065	2.60	2.65	0000000	0.0163	0.65	0.662	Wt. per cubic foot....." 480 ".....489.6							
17	.058	2.32	2.37	0000000	0.0125	0.5	0.512	Wt. per cubic inch....." 0.2778 ".....0.2833							

As there are many gauges in use differing from each other, and even the thicknesses of a certain specified gauge, as the Birmingham, are not assumed the same by all manufacturers, orders for sheets and wires should always state the weight per square foot, or the thickness in thousandths of an inch.—Kent 1916.

USEFUL INFORMATION

TO COMPUTE WEIGHTS OF DIFFERENT MATERIALS

SHEETS

Steel—Divide the thickness, expressed in thousandths by 25. The result is the weight in pounds per square foot.
 Brass—Add 11 per cent to the weight of sheet steel.
 Copper—Add 10 per cent to the weight of sheet steel.

BARS AND PLATES

Iron—Multiply contents in cubic inches by .27777. Result will be weight in pounds.
 Steel—Multiply contents in cubic inches by .28332. Result will be weight in pounds.
 Copper—Multiply contents in cubic inches by .32118. Result will be weight in pounds.
 Brass—Multiply contents in cubic inches by .3112. Result will be weight in pounds.
 Lead—Multiply contents in cubic inches by .41015. Result will be weight in pounds.
 Zinc—Multiply contents in cubic inches by .25318. Result will be weight in pounds.
 Aluminum—Multiply contents in cubic inches by .09375. Result will be weight in pounds.

MELTING POINTS OF METALS, FAHRENHEIT

	Degrees
Alloy, 3 Lead, 2 Tin, 5 Bismuth.....	200
Alloy, 1 Tin, 1 Lead.....	370-460
Aluminum.....	1,160
Aluminum Bronze.....	1,700
Antimony.....	950
Bismuth.....	510
Brass.....	1,870
Bronze.....	1,690
Copper.....	2,000
Gold.....	2,020
Iron, Cast.....	2,075
Iron, Cast..... White	2,264
Iron, Cast..... Gray	3,000-3,500
Iron, Wrought.....	610
Lead.....	1,200
Magnesium.....	—39
Mercury.....	3,500
Platinum.....	2,370-2,550
Steel.....	1,860
Silver.....	445
Tin.....	700
Zinc.....	

WEIGHT AND SPECIFIC GRAVITY OF METALS

	Wt. per Cu. Ft. Lbs.	Wt. per Cu. In. Lbs.	Specific Gravity
Aluminum.....	166	.096	2.67
Antimony.....	419	.242	6.72
Bismuth.....	613	.353	9.822
Brass, Cast.....	524	.3	8.4
Bronze.....	534	.308	8.561
Copper, Cast.....	537	.31	8.607
Copper Wire.....	555	.32	8.9
Gold, 24 Karat.....	1,208	.697	19.361
Gold, Standard.....	1,106	.638	17.724
Gun Metal.....	528	.304	8.459
Zinc.....	437	.252	7.
Iron, Cast.....	450	.26	7.21
Iron, Wrought.....	485	.28	7.78
Lead, Cast.....	708	.408	11.36
Lead, Rolled.....	711	.41	11.41
Mercury.....	849	.489	13.596
Platinum.....	1,344	.775	21.531
Platinum Sheet.....	1,436	.828	23.
Silver, Pure.....	654	.377	10.474
Silver, Standard.....	644	.371	10.312
Steel.....	490	.284	7.85
Tin, Cast.....	455	.262	7.291

RULES FOR OBTAINING APPROXIMATE WEIGHT OF IRON

FOR ROUND BARS

Rule—Multiply the square of the diameter in inches by the length in feet and that product by 2.6. The product will be the weight in pounds, nearly.

FOR SQUARES AND FLAT BARS

Rule—Multiply the area of the end of the bar in inches by the length in feet and that by 3.32. The product will be the weight in pounds, nearly.

WROUGHT IRON, USUALLY ASSUMED

A cubic foot..... = 480 lbs.
 A square foot, 1 inch thick..... = 40 lbs.
 A bar 1 inch square, 1 foot long..... = 3½ lbs.
 A bar 1 inch square, 1 yard long..... = 10 lbs.

To find the weight of cast iron balls when the diameter is given.

Rule—Multiply the cube of the diameter by .1377.

To find the diameter of cast iron balls when the weight is given.

Rule—Multiply the cube root of the weight by 1.936.

To find the weight of a spherical shell.

From the weight of a ball of the outer diameter subtract the weight of one of the inner diameters.

TO CONVERT THE WEIGHT OF

Wrought Iron into Cast Iron.....	×0.928
" " " Steel.....	×1.014
" " " Zinc.....	×0.918
" " " Brass.....	×1.082
" " " Copper.....	×1.144
" " " Lead.....	×1.468

DECIMAL APPROXIMATIONS USEFUL IN CALCULATIONS

Cubic inches	× .263	— lbs. average cast iron
" "	× .281	— " " wrought iron
" "	× .3225	— " " cast steel
" "	× .3037	— " " copper
" "	× .26	— " " brass
" "	× .4103	— " " lead
" "	× .2636	— " " tin
" "	× .4908	— " " mercury
Cylin. "	× .2065	— " " cast iron
" "	× .2168	— " " wrought iron
" "	× .2223	— " " cast steel
" "	× .2533	— " " copper
" "	× .2385	— " " brass
" "	× .2042	— " " zinc
" "	× .3223	— " " lead
" "	× .207	— " " tin
" "	× .3854	— " " mercury

SPECIFIC GRAVITIES

Cast Iron.....	average 7.21
Wrought Iron.....	" 7.78
Cast Steel.....	" 7.85
Bessemer Steel.....	" 7.86

Light iron indicates impurity.

The heaviest steel contains least carbon.

WEIGHTS OF METALS

WEIGHT OF A SUPERFICIAL FOOT

Thickness Inch	Wrought Iron Pounds	Cast Iron Pounds	Steel Pounds	Copper Pounds	Brass Pounds	Lead Pounds	Zinc Pounds
1/8	2.53	2.34	2.55	2.89	2.73	3.71	2.34
1/4	5.05	4.69	5.10	5.78	5.47	7.42	4.69
3/8	7.58	7.03	7.66	8.67	8.20	11.13	7.03
1/2	10.10	9.38	10.21	11.56	10.94	14.83	9.38
5/8	12.63	11.72	12.76	14.45	13.67	18.54	11.72
3/4	15.16	14.06	15.31	17.34	16.41	22.25	14.06
7/8	20.21	18.75	20.42	23.13	21.88	29.67	18.75
1	30.31	28.13	30.63	34.69	32.81	44.50	28.13
1 1/8	40.42	37.50	40.83	46.25	43.75	59.33	37.50

USEFUL INFORMATION

AVOIRDUPOIS WEIGHT

Drachms	
16 =	1 oz. = 437.5 grains troy.
256 =	16 = 1 lb. = 1.2153 lbs. troy.
6,400 =	400 = 25 = 1 quarter.
25,600 =	1,600 = 100 = 4 = 1 cwt.
512,000 =	32,000 = 2,000 = 80 = 20 = 1 ton.

TROY WEIGHT

Grains	
24 =	1 dwt.
480 =	20 = 1 oz.
5,760 =	240 = 12 = 1 lb. = 22.816 cubic inches of distilled water at 62° Fahr.

DRY MEASURE

ints =	33.6 cubic inches.
2 =	1 quart = 67.2 cubic inches.
8 =	4 = 1 gallon = 268.8 cubic inches.
16 =	8 = 2 = 1 peck = 537.6 cubic inches.
64 =	32 = 8 = 4 = 1 bushel.
Note.—The standard U. S. bushel is the Winchester bushel, which is in cylinder form, 18½ inches in diameter and 8 inches deep, and contains 2150.42 cubic inches.	

SQUARE MEASURE

Inches	
144 =	1 foot.
1,296 =	9 = 1 yard.
39,204 =	272.25 = 30.25 = 1 perch.
1,568,160 =	10,890 = 1,210 = 40 = 1 rod.
6,272,640 =	43,580 = 4,840 = 160 = 4 = 1 acre.
An acre is 69.5701 yards per square; or, 208.710321 feet square.	
A township is 6 miles square = 36 sections.	
A section is 1 mile square = 640 acres.	
A section is ½ mile square = 160 acres.	
A section is ¼ mile square = 40 acres.	
A span is the distance that can be reached between the end of the middle finger and the end of the thumb. Among sailors 8 spans are equal to 1 thumb.	
A geographic mile is 1/21000 of the distance around the center of the earth.	
A square mile of land is called a section.	
A Gunter's chain, used by land surveyors, is 4 rods, or 66 feet long, and consists of 100 links. 7.92 inches make a link.	
Canal and railroad engineers use an engineer's chain, which consists of 100 links, each 1 foot long.	

PAPER MEASURE

Quire of paper.....	24 sheets.
Ream of paper.....	20 quires or 480 sheets.
Bundle.....	2 reams.
Bale.....	5 bundles.
Roll of parchment.....	60 skins.
Sheet of paper folded into—	
2 leaves is termed folio size.	
4 leaves is termed 4to. or quarto.	
8 leaves is termed 8vo. or octavo.	
12 leaves is termed 12mo. or duodecimo.	
16 leaves is termed 16mo.	
18 leaves is termed 18mo.	
24 leaves is termed 24mo.	
48 leaves is termed 48mo.	

APOTHECARIES' WEIGHT

Grains	
20 =	1 scruple or ʒ
60 =	3 = 1 drachm or ʒ
480 =	24 = 8 = 1 oz. or ʒ
5,760 =	288 = 96 = 12 = 1 lb.

APOTHECARIES' MEASURE

60 minims.....	= 1 fluid-drachm.
8 fluid-drachms.....	= 1 fluid-ounce.
16 fluid-ounces.....	= 1 pint.
8 pints.....	= 1 gallon.
Forty-five drops, or a common teaspoonful, make about 1 fluid-drachm; 2 tablespoonsful, about 1 fluid-ounce; a wine-glassful, about 1½ fluid-ounces; and a teacupful, about 4 fluid-ounces.	

LIQUID OR WINE MEASURE

Gills =	7.2187 cubic inches.
4 =	1 pint = 28.875 cubic inches.
8 =	2 = 1 quart = 57.75 cubic inches.
32 =	8 = 4 = 1 gallon.
2,016 =	404 = 252 = 63 = 1 hogshead.
4,032 =	1,008 = 504 = 126 = 2 = 1 pipe.
8,064 =	2,016 = 1,008 = 252 = 4 = 2 = 1 ton.
Note.—The standard unit and liquid measure adopted by the U. S. Government is the Winchester wine gallon, which contains 231 cubic inches, and holds 8.339 pounds, avoirdupois, of distilled water, at its maximum density weighed in air, the barometer being at 30 inches.	
The imperial gallon, adopted by Great Britain, contains 277.274 cubic inches, and equals 1.20032 U. S. gallons.	
The following cylinders contain some of these measures very closely:	
Gill, diameter,	1¾ inches; height, 3 inches.
Pint, diameter,	3½ inches; height, 3 inches.
Quart, diameter,	3½ inches; height, 6 inches.
Gallon, diameter,	7 inches; height, 6 inches.
8 gallon, diameter,	14 inches; height, 12 inches.
10 gallon, diameter,	14 inches; height, 15 inches.

WEIGHT OF WATER

1 cubic inch.....	= .03617 pounds.
12 cubic inches.....	= .0434 pounds.
1 cubic foot.....	= 7.48052 U. S. gallons.
1 U. S. gallon.....	= 8.355 pounds.
1.8 cubic feet.....	= .2240 pounds.
2,240 pounds.....	= 268.8 U. S. gallons.

LIQUID WEIGHT

	Lbs. Avoirdupois
1 gallon distilled water.....	10
1 gallon sea water.....	10.32
1 gallon proof spirits.....	9.08

WEIGHT OF OILS

	Lbs. Avoirdupois
1 gallon sperm.....	7½
1 gallon whale.....	7½
1 gallon lard.....	7½
1 gallon tallow.....	7½
1 gallon neat's-foot.....	7½
1 gallon paraffine, 28° gravity.....	7¾
1 gallon paraffine, 25° gravity.....	7½
1 gallon reduced Franklin.....	7¼
1 gallon castor.....	8
1 gallon kerosene.....	6½

USEFUL INFORMATION

TO TEMPER STEEL ON ONE EDGE

Dip the edge to be tempered into hot lead until proper color; then temper in ordinary fashion.

TO DRILL HARDENED STEEL

Cover your steel with melted beeswax; when coated and cold, make a hole in the wax with a fine-pointed needle or other article the size of hole you require, put a drop of strong nitric acid upon it; after an hour rinse off and apply again; it will gradually eat through.

A mixture of 1 ounce of sulphate of copper, $\frac{1}{4}$ ounce of alum; $\frac{1}{2}$ teaspoonful of powdered salt, 1 gill of vinegar and 20 drops of nitric acid will make a hole in steel that is too hard to cut or file easily.

A small hole drilled at the end of a crack in sheet will stop it from growing longer.

ANNEALING STEEL

For small pieces of steel, take a piece of gas pipe, 2 or 3 inches in diameter, and put the pieces in it, first heating one end of the pipe, and drawing it together, leaving the other end open to look into. When the pieces are of cherry red, cover the fire with sawdust, use a charcoal fire, and leave the steel in over night.

IN TURNING STEEL OR OTHER HARD METAL

Use a drip composed of petroleum two parts and turpentine one part. This will insure easy cutting and perfect tools when otherwise the work would stop, owing to the breakage of tools from the severe strain.

TEMPERING RECIPES

Resin, 2 pounds; tallow, 2 pounds; pitch, 1 pound. Melt together and dip the hot steel in it.

Salt, $\frac{1}{2}$ cupful; saltpetre, $\frac{1}{2}$ ounce; alum, pulverized, 1 teaspoonful; soft water, 9 gallons. Never heat above a cherry red nor draw any temper.

By melting together 1 gallon spermacetti oil; 2 pounds tallow and $\frac{1}{4}$ pound wax, a mixture is obtained very convenient for tempering any kind of steel article of small size. Adding 1 pound resin makes it suitable for larger articles.

TO HARDEN GRAVERS

Heat in charcoal dust (not too hot), and plunge into a box of wet, yellow soap. This renders the end of the graver very hard and very tough.

Strong sal soda water or soapy water is much better than clean water to use where water cuts are being taken, either on lathe or planer. When cutting brass, sweet milk is recommended as being better than either the foregoing.

MIXTURE FOR WELDING STEEL

1 sal-ammoniac.
10 borax.

Pounded together and fused until clear, when it is poured out, and, after cooling, reduced to powder.

RUST JOINT CEMENT. QUICKLY SETTING

1 sal-ammoniac in powder, by weight.
2 flour sulphur.
80 iron borings made to a paste with water.

RUST JOINT. SLOWLY SETTING

2 sal-ammoniac.
1 flour of Sulphur.
200 iron borings.

The latter cement is the best if the joint is not required for immediate use.

RED LEAD CEMENT FOR FACE JOINTS

1 of white lead.
1 of red lead, mixed with linseed oil to the proper consistency.

CASE-HARDENING MIXTURE

3 prussiate of potash.
1 sal-ammoniac.
or,
1 prussiate of potash.
2 sal-ammoniac.
2 bone dust.

GLUE TO RESIST MOISTURE

1 pound of glue melted in 2 quarts of skim milk.

MARINE GLUE

1 of India rubber, 12 of mineral naphtha or coal tar. Heat gently, mix, and add 20 of powdered shellac. Pour out on a slab to cool. When used, to be heated to about 250°.

GLUE CEMENT TO RESIST MOISTURE

1 glue.
1 black resin. } Mixed with least possible
 $\frac{1}{4}$ red ochre. } quantity of water.
or,
4 of glue, or 1 oxide of iron.
1 of boiled oil (by weight).

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